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ABSTRACT

This report describes a program for improving students' depth of understanding through the use of alternative assessment. The targeted population consisted of students at one elementary, one junior high, and two high schools in two growing middle class communities in northern Illinois. Lack of student understanding was documented through teacher observation checklists, journal entries, student reflections, and content evaluations. Analysis of probable cause data reveals that students' lack of understanding is due to current assessment practices, currently used instructional strategies, and scheduling and curriculum constraints. A review of solution strategies suggested by researchers and educators, combined with an analysis of program setting, resulted in the selection of two major categories of intervention. The first was a revision of instructional strategies focusing on higher-order thinking, problem solving, and cooperative learning. The second was implementing alternative assessments to evaluate student understanding and creating opportunities for student self-assessment. Postintervention data indicated an increase in students' depth of understanding of content. Through the use of cooperative learning, class bonding took place and a comfortable learning environment was created. With an emphasis placed on the use of graphic organizers, students were better with their organizational skills. The continued teaching of problem-solving strategies improved students' ability to think logically. Alternative assessments provided students with a greater sense of ownership of their work, a more enthusiastic approach to learning, and the increased use of higher-order thinking. Student reflection requirements developed their metacognitive skills and gave students a way to assess and chart their own progress. Evidence shows that students have gone beyond the basics to a deeper understanding of content. Thirty-seven appendixes present cover letters and forms used in the study and other supplemental information. (Contains 8 tables and 49 references.) (Author/SLD)

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IMPROVING STUDENT DEPTH OF UNDERSTANDING THROUGH THE USE OF ALTERNATIVE ASSESSMENT

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ABSTRACT

This report describes a program for improving students' depth of understanding through the use of alternative assessment. The targeted population consists of elementary, junior high, and high school students in two growing, middle class communities located in northern Illinois. Lack of student understanding will be documented through teacher observation checklists and journal entries and student reflections and content evaluations.

Analysis of probable cause data reveals that students' lack of understanding is due to current assessment practices, currently utilized instructional strategies, and scheduling and curriculum constraints.

A review of solution strategies suggested by knowledgeable others, combined with an analysis of the problem setting, resulted in the selection of two major categories of intervention. The first intervention consists of a revision of instructional strategies focusing on higher-order thinking, problem-solving, and cooperative learning. The second intervention consists of implementing alternative assessments to evaluate student understanding and creating opportunities for student self-assessment.

Post intervention data indicated an increase in students' depth of understanding of content. Through the use of cooperative learning, class bonding took place and a comfortable learning environment was created. With an emphasis placed on the use of graphic organizers, students were better with their organizational skills. The continued teaching of problem solving strategies, improved students' ability to think logically. Alternative assessments provided students with a greater sense of ownership of their work, a more enthusiastic approach to learning, and the increased use of higher-order thinking. Student reflection requirements developed students' metacognitive skills and gave the students a way to self-assess and chart their own progress. Evidence showed that students went beyond the basics to a deeper understanding of content.

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CHAPTER 1

PROBLEM STATEMENT AND CONTEXT

General Statement of the Problem

In the targeted elementary, junior high, and high school classes, students are unable to demonstrate depth of understanding of content. Evidence for the existence of the problem includes students' inability to explain their thought processes, inadequate performance on traditional tests, and disparity between test scores and daily performance.

Immediate Problem Context

School A

School (A) is an elementary school in a mid-sized community. The setting for the research is best described through the description of the facility, the student population, the academic staff, and the programs' offered at the school.

Targeted school (A) was built in 1895. It was the first school built in the community and it served as a K-12 facility for the entire area. Later, when a separate high school was constructed, the building became a K-8 facility for a number of years. In 1954, four classrooms and a gymnasium were added to the structure. It has served solely as an elementary K-6 facility since 1956 with no further additions or improvements. There are thirteen classrooms, two for each grade level. However, because of the age of the building, there are not adequate classrooms for the specialized subjects. Music and art share the "old" gym located deep in the basement. Special Education and Title I Reading share a room in the first level of the basement, and speech and gifted classes are housed in what used to be closets and cloakrooms. There is no space available for science labs or computer labs that exist in newer elementary buildings in the district.

The school is located in a residential area not far from the community's business district. About two-thirds of the students are from the neighborhood area and the remainder is bussed in from surrounding subdivisions. All students at this school are heterogeneously grouped and learn in self-contained classrooms.

There is a total of 282 elementary students currently enrolled in the school, ranging from kindergarten through sixth grade. This school is currently one of six elementary facilities in the community. The student population consists of the following: 78.0% White, 21.3% Mexican American, 0.4% Black, and 0.4 % Asian with no Native American students. Data concerning family socioeconomic status indicates 23.0% are in the low income bracket, and 4.3 % have limited English proficiency. The school has a 95.2% attendance rate with only 0.7% chronic truancy. The student mobility rate is 28.1% (School Report Card, 1996a).

The academic staff at school (A) consists of the following: 1 principal, 13 classroom teachers, 3 full-time specialized teachers, 2 aides, and 1 secretary. The school is also serviced on a part-time rotating basis by: five specialized teachers, one librarian, two psychologists, and three nurses. The administrative and teaching staff is 100% White with 90% female and 10% male. The average teaching experience for teachers in the district is 15.9 years. The district pupil-teacher ratio at the elementary level is 18 to 1 with the pupil-administrator ratio being 336 to 1.

(School Report Card, 1996a).

School (A) is currently involved in the inclusion program keeping learning disabled (L.D.) students and Title I reading students in their regular classrooms instead of using the pull-out method. The L.D. and the Title I teachers rotate into the various classrooms on a thirty minute per day schedule. The school provides specialists in four areas: physical education (1-6), vocal music (1-6), art (3-6), and instrumental music (5-6). Speech and language therapists and a hearing technician are available as needed.

Although the building is old, an upcoming referendum will hopefully replace it in a couple of years. Nevertheless, the academic team and the students work well together to achieve maximum learning.

School B

This junior high school exists in the same community as school (A) and is under the leadership of the same community unit school district. The setting can be best understood by a description of the facility, the student body, the faculty, and the general program and operating schedules of the building.

School (B) is a new facility that has been in use since 1990 and consists of four hallways with classrooms grouped by department, similar to the high school format. Last year, to accommodate steadily increasing numbers of students, additions were built that included six new classrooms, expansion of the library into a media center, and a smaller auxiliary gym. The school (and district) has been perpetually behind in acquiring new technology, so the only computers available have been old Apple machines with primitive software. However, the situation should improve somewhat next year when a new computer lab of IBM's is installed and the Apples are moved to replace typewriters in keyboarding.

There are currently 885 students at the junior high school, which includes 447 students in seventh grade and 438 in eighth grade. Information from the 1996 School Report Card states that the student population consists of the following: 86.4% White, 11.6% Mexican American, 1.0% Black, and less than 1.0% Asian and Native American students. Of the above figures 17.0% come from low-income families, which is less than half of the state level of 34.9%. The student attendance rate is 94.6%, with a mobility rate of 12.1%, compared to the state figures of 93.5% and 18.8%, respectively. Chronic truancy is a relatively low 1.3%, a full percentage point lower than the state average.

The number of faculty and staff comes to a total of 65 members, which includes 53 certified teachers -- 18 are male and 35 are female. The entire faculty is Caucasian with the exception of one African-American. The support staff is made up of three full-time secretaries, two guidance counselors, three aides, one nurse, and four division heads who oversee several departments. Both of the administrators, the principal and assistant principal, have held their positions for three years.

The math department at school (B) is divided into two levels for seventh grade and three levels for eighth grade. Formerly, a basic concepts' level existed for both seventh and eighth grade, but in 1994 it was absorbed into the regular level for both grades. Currently, there are nine sections, involving about 250 students, in regular seventh grade math and five sections, consisting of about 150 students, in Honors Math. During the spring of the year, three factors are considered for eighth grade placement: a standard algebra prognosis test (40%); students' math test average for the year (33%); and students' grades in other classes (27%). Cut off scores are then determined for the two sections of algebra, the seven sections of pre-algebra, and the seven sections of regular math.

The one split-schedule and five full-time teachers are given a good deal of freedom by the administration to choose and spend time on whatever topics they feel are important. Very little pressure is placed on finishing every chapter or covering a certain amount of material. Rather, the greater concern is with ensuring student learning and success. Math department members frequently check with each other on classroom progress and informally share ideas, materials, techniques, and suggestions. The overall atmosphere is very collegial and professional.

School (B) has a traditionally structured approach to the curriculum like a junior high school, as opposed to the middle school concept. The school day begins at 8:21 a.m. with a sixteen-minute homeroom and consists of nine forty-minute periods with a passing time of four minutes between classes. Lunch is broken up into three sections -- the earliest at 10:48 a.m. and the latest at 12:17 a.m. -- but will probably have to expand to four periods next year to account for growing numbers of students. School is dismissed at 3:00 p.m. The average class size is currently 22.5 and increasing. The district has an operating expenditure of $4,057 per pupil, which is about 30% behind the state average of $5,922. Despite this lack of funding, school (B) is able to offer many programs in addition to the regular academic classes and electives, including: Academic Bowl, Math Counts, Video Club, Yearbook, Student Council, Jazz Band, Pompons and Cheerleading, as well as five different sports for boys and girls (School Report Card, 1996b).

School C

This high school is located in the same community unit school district as schools (A) and (B). The research setting consists of the school's programs, student population, faculty, and administrative structure.

School (C) is the only senior high school in its district serving grades 9 - 12. It offers all major academic areas as well as programs in music, agriculture, drafting, electricity, computers, and small engines. The school also offers advanced placement courses in psychology, calculus, and English.

The high school's mathematics department consists of twelve teachers, most of whom hold masters' degrees and above. There are thirteen different courses offered, ranging from general math to a full year of advanced placement calculus. As a freshman, students can begin their study of mathematics at one of four levels: general math, pre-algebra, algebra, or honors algebra. Students may then follow the normal class progression upward for as many years as they wish. The graduation requirement for this high school is the same as the state's requirement which is two credits. Because of this, many students only take two years of mathematics.

Most of the math teachers in this high school teach five or six classes. All teachers have at least two preparations. It is normal to have three or more teachers teaching the same subject; therefore, it is necessary to have time for communication among the teachers. However, that communication within and between grade levels is rare, because of busy and conflicting schedules. Unlike school (B), the teachers at the high school level have no autonomy as to what can be taught. The subject matter, chapters, and material covered are mandated, in large, by the standardized department finals given to all students.

The math department chair is also in charge of three other departments at the high school and the same four departments at the district's junior high school. It is a non-teaching position, which frees up time for adequate support in terms of accessing classroom supplies, manipulatives, and opinions regarding teaching practices.

The total student population of school (C) is approximately 1,550. The ethnic makeup of the school's students consists of the following: 88.1% White, 0.9% Black, 10.3% Mexican American, 0.5% Asian/Pacific Islander, and 0.1% Native American. Thirteen percent of the school population consists of students from low-income families. Nine-tenths of one percent of the students are limited-English-proficient and the dropout rate is 5.1%. The school attendance rate is currently at 92.8% and chronic truancy is at 6.8%.

One hundred percent of the district's 266 classroom teachers are White, with 25% male and 75% female. The average teaching experience in the district is 15.9 years; 49.1% of the teachers hold only a bachelor's degree, and the remaining 50.9% hold a master's degree or above. The average teacher-pupil ratio is 19.2 to1 (School Report Card, 1996c).

School (C) operates under a departmental structure which is headed by two department chairpersons. One chairperson oversees language arts and the social sciences. The other department chair is in charge of mathematics, science, library and media, and fine arts. There are four guidance counselors, three assistant principals, and one principal.

This high school is currently overcrowded and decisions will have to be made very soon as to how to handle this problem. A referendum is coming up soon to add classrooms which would relieve the space problem. Nevertheless, with future-conscious administrators and an up-to-date teaching staff, education is clearly top priority in this high school.

School D

The research setting is a rural high school that serves grades 9-12. School (D) is in a small, agricultural community in northern Illinois. The setting is best presented through a description of the facility, the student population, the faculty, and the programs offered.

School (D) is a two-story building that is connected to a one-story junior high school. The high school and junior high are separated by a hallway and a large commons area. The high school facility is in good repair and is adequate in size for the student population. The school consists of the following: five hallways of classrooms that are organized by department, a resource center, a gymnasium, a main office, and a large commons area that also serves as the school cafeteria. The majority of academic classes are tracked in a general, advanced, and honors format.

The faculty of school (D) consists of 26 certified teachers, of which 13 are male and 13 are female. The average teaching experience is 14.4 years. Fifty-three percent of the faculty holds a master's degree or above. One hundred percent of the faculty is Caucasian. The support staff consists of the following: two aides for students with learning disabilities, one full-time counselor, one part-time social worker, one part-time psychologist, one part-time nurse, two full-time secretaries, and three administrators. The principal of the high school has held his position for seven years; the vice-principal has held his position for two years; and the athletic director/vice-principal has held his position for four years. The average class size is 19.8 students compared to the district average of 22 students. The school day begins at 7:40 a.m. and ends at 3:02 p.m. The day consists of eight forty-eight minute periods with two different lunch servings included. The schedule will change dramatically for the 1997-98 school year with the implementation of a four-block schedule. The dropout rate is 1.1% and average expenditure per student is $4,566.

The racial/ethnic composition of the student body is 98.1% White and 1.9% Mexican American. Two and four-tenths percent of all of school (D) students are low-income. The total student enrollment is 368 students (School Report Card, 1996d). In addition to the basic core and elective academic classes, the following programs are in place in school (D): National Honor Society, JETS Team, Scholastic Bowl, Rain Forest Preservation, Student Council, Beta Club, Speech/Debate, Snowball/Snowflake (drug awareness), and Peer Mentoring/Peer Mediation.

The English curriculum at school (D) is delivered by three full-time teachers. One of the three teachers acts as the English department chair. All classes in the English department are tracked into three levels: Honors, Advanced, and General. All students enrolled in school (D) are required to meet a four-year English requirement in order to graduate.

The Surrounding Community

School District A

Schools (A), (B), and (C) are a part of school district (A) which serves one community with a population of 17,722 plus two smaller communities and the surrounding county area for a total district population of 28,341. The socioeconomic status, the growth rate, and the educational level of the adult population of the community, as well as the size and administrative structure of the district all play an important role in the context of the problem.

The median family income of community (A) is $38,395. The racial composition of the county comprises the following: 95.6% White, 0.6% Black, 0.5% Asian, 0.2% Native American, and 3.1% other races, with 7.7% of Mexican American origin regardless of race (Growth Dimensions, 1996).

The community has experienced considerable residential growth in the last decade. The population is up 15.9% from the 1990 census. Forty-five percent of migration into the community comes from a very large metropolitan area; 15% is from an urban community within 15 miles; 21% is from other communities within the state, and 16% is from other states. The manufacturing sector employs 31% of the working population of the community, followed by retail trade at 17.1%, and service jobs at 18.5%. The unemployment rate for 1996 was 4.7% (Growth Dimensions, 1996).

The community has a wide range of educational levels among its adult population. Twenty-four and one-half percent have not completed high school; 40.1% are high school graduates; and 35.3% have had some degree of higher education (Growth Dimensions, 1996).

The school district is a community unit district. There are one high school, one junior high, six elementary schools, and one special education facility within the district. Special education services the mentally impaired, the hearing impaired, the visually impaired, the physically disabled, the speech and language impaired, and the learning disabled child. The total student population of the school district was 5,202 in the 1996-1997 school year.

The central office administration of this school district consists of an appointed superintendent, an assistant superintendent of business, an assistant superintendent of curriculum, and a director of special education. The board of education consists of seven members from the community who are elected to four-year terms. The board's responsibilities are to deal with budget, curriculum, staffing, facilities, and discipline.

The school district is in one of the fastest-growing areas in the state. Two new schools have been built in the past two years (three in the past decade) and there is a referendum at hand to replace one elementary school and upgrade the high school.

School District B

School (D) is part of a school district (B). The students live in a small, rural community of approximately 2,100 people. However, the community is growing due to the development of two new residential housing projects. Geographically, the district is located midway between two large urban areas. The average household income is approximately $30,000 per year. The school district has approximately 13,500 students and has recently been experiencing a rapid increase in growth. The district is made up of three high schools, five junior high schools, and eleven elementary schools. The small size of the community creates familiarity among its citizens. The business district is quite small and the lack of entertainment venues such as movie theaters and bowling alleys focus the attention of the community on school activities. The school and community take pride in the athletic tradition that has been established over the last twenty years. The football program has claimed three state championship trophies since 1976, with the most recent being 1995.

National Context of the Problem

Cries of "accountability" in education have led to a wave of assessment vehicles and strategies that threaten to reduce schools to the status of testing centers. Standardized testing has come to be viewed by the public as the panacea for educational problems. However, a look at the research shows that current methods of assessment are, at best, questionable in their validity and reliability. Specifically, the emphasis placed on standardized test scores puts pressure on teachers to "teach to the test." Traditional tests are often separated from the learning process, and finally (and most dangerously), test scores are viewed as an end in themselves for improving education.

The purpose of assessment is to provide feedback about what knowledge and abilities students possess, in order to make appropriate instructional decisions and improve student learning. It attempts to answer two questions: "How are we doing? ," and "How can we do it better?" (Herman, Aschbacher, & Winters, 1992, p. vi). The original purpose of standardized tests was noble--to develop national norms for comparing all schools and students using the same assessment instrument. However, the time required to administer the test is justified only if the results are truly informative and are used to improve the quality of education. "Our current practice sends a clear message to everyone that standardized tests are given for administrative and political purposes and not for educational purposes" (Harris, 1992, p. 8).

Unfortunately, most tests serve only to sort, select, and group students according to their scores, failing to make any curriculum adjustments that will be helpful to individual students (Harris, 1992). Since there are high stakes involved (promotion/retention, class rank, college admission, scholarships, etc.), teachers understandably feel the temptation to "teach to the test," causing students to be exposed to a broader, but shallower, curriculum (Burke, 1994; Harris, 1992). Students have been exposed to a wide range of topics but lack in-depth knowledge of any of them.

Another common misconception is that assessment and student learning are separate issues:

> Students come to believe that learning is cramming; teachers come to believe that tests are after-the-fact, imposed nuisances composed of contrived questions--irrelevant to their intent and success. Both parties are led to believe that right answers matter more than habits of mind and the justification of one's approach and results (Wiggins, 1990, p.2).

Herman et al. (1992) and Burke (1994) agree that good assessment must be an integral part of instruction. Traditional tests stress answers (right or wrong) over reasons, and rely upon secrecy for their validity. They overemphasize discrete, routine skills learned out of context and neglect more significant matters such as problem solving and complex thinking (Wiggins, 1990; Herman et al., 1992).

In contrast, a "Thinking Curriculum" affirms the importance of process alongside the product (Herman et al., 1992). Often, students are turned off and unmotivated because they are being assessed on insignificant, meaningless, useless information and/or skills. Too often, tests are merely a reflection of what has already been taught, and rarely challenge students to transfer and apply what they have learned (Wiggins, 1990). This is not just a problem with national standardized tests. Many teachers lack the necessary training in testing and measurement, and thus make their own tests just as poorly, or worse. Even skilled and experienced teachers who implement higher-order thinking, cooperative learning, multiple intelligences, etc. in their classrooms often revert to the traditional, multiple-choice test (Burke, 1994). Students must be able to apply what they have learned and transfer that knowledge to new situations or they will be unprepared to enter the workforce.

Perhaps the most frightening problem in its implications for the future of education is the general public's tendency to see test scores as the ticket to improving education. America 2000 and the National Education Goals developed by the President and state governors call for increased accountability in order to keep up with international competition. "Requiring us to assess progress, they often pose assessment itself as a key to attaining such progress, thus ensuring assessment's priority status in schools. (Herman et al., 1992, p. 1). Many companies exist solely to create, administer and score standardized tests. It has become big business. Real estate offices advertise property as being in a community with "good schools" based on standardized test results. Test scores today are used for many purposes which they were never intended to address. Standardized tests do not measure significant outcomes, do not reflect growth and development, and do not accurately report what students can or cannot do (Burke, 1994). Likewise, no assessment can reliably describe more than what it is intended to measure. Nothing can substitute for the human factor provided by parents and teachers.

Several problems exist with the current methods of assessment in American education. People place emphasis on testing rather than teaching and learning. Tests, then, become a separate process in themselves, and test scores are used as the final indicator of the success or failure of schools. People have been distracted from the real issue--to use test results to constantly improve the quality of instruction and the level of learning. Do not be misled: "Norms are not standards; items are not real problems; right answers are not rationales" (Wiggins, 1990, p.2).

CHAPTER 2

PROBLEM DOCUMENTATION

Problem Evidence

In the attempt to show evidence that there is a lack of understanding of content in students in each of the targeted classrooms, each teacher/researcher kept a journal and used observation checklists (Appendix F). In addition, surveys were conducted by the researchers with both parents and students (Appendices B & D). The questions on each survey queried respondents concerning students' abilities and study habits. The surveys also inquired as to the length of students' attention spans, amount of time spent nightly on homework, academic strengths, and areas where improvement is needed. Possible answers to the questions on both surveys were 1 = most of the time, 2 = sometimes, 3 = rarely, and 4 = never. The results of both surveys helped in identifying several possible causes of the issue at hand.

Table 1

Results of Pre-Intervention Student Survey

	Elementary School A n = 15				Junior High School B n = 30				H.S. Math School C n = 24				H.S. English School D n = 23			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
I like to find out about things on my own.	3	9	0	3	12	18	0	0	12	11	0	1	8	15	0	0
I like to learn and am curious about things	8	5	1	1	16	14	0	0	17	5	2	0	8	14	1	0
I like to read	8	4	1	2	11	14	5	0	11	6	7	0	3	11	8	1
I understand what I read	7	5	3	0	19	11	0	0	16	6	1	1	14	8	1	0
I like to write	9	2	1	3	15	13	1	1	11	11	1	1	6	7	10	0
I enjoy creative activities	9	4	1	1	21	9	0	0	18	5	1	0	8	10	5	0
I like math and working with numbers	8	5	0	2	11	17	2	0	7	10	6	1	7	5	7	4
I keep working at things even if they seem hard.	12	2	0	1	11	17	2	0	9	15	0	0	9	11	3	0
My friends influence how I work in class	7	3	2	3	0	8	15	7	5	14	3	2	0	11	7	5
I do homework every night	9	2	3	1	23	7	0	0	10	12	1	1	2	12	9	0
My friends & relatives have high expectations.	11	2	2	0	18	12	0	0	15	8	0	1	13	8	2	0

Key:
1 = Most of the time
2 = Sometimes
3 = Rarely
4 = Never

Table 2

Results of Pre-Intervention Parent Survey

	Elementary School A n = 15				Junior High School B n = 30				H.S. Math School C n = 24				H.S. English School D n = 23			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Can stay on task until completion	9	6	0	0	16	12	0	0	8	12	1	0	7	8	0	0
Seems to want to learn/curious about things.	13	2	0	0	18	10	0	0	18	2	1	0	6	8	1	0
Makes free time choices independently	7	6	1	1	15	13	0	0	14	6	1	0	9	6	0	0
Likes to read.	7	8	0	0	10	13	4	1	10	8	2	1	5	2	7	1
Understands what he/she reads.	11	4	0	0	15	12	1	0	15	6	0	0	9	6	0	0
Likes to write.	8	6	1	0	9	13	5	1	9	10	1	1	4	4	7	0
Is creative in many areas.	9	5	1	0	13	13	2	0	12	9	0	0	7	8	0	0
Is good with numbers	9	6	0	0	11	12	4	1	8	11	2	0	7	6	2	0
Is good at problem solving	10	4	1	0	10	12	5	1	10	9	2	0	3	11	1	0
Is easily influenced by his/her peers	5	9	1	0	2	19	4	3	6	10	5	0	2	7	3	3
Does homework every night	13	2	0	0	16	10	2	0	12	5	4	0	3	6	6	0

Key:
1 = Most of the time
2 = Sometimes
3 = Rarely
4 = Never

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School A

The data collected at the elementary level show that most parents believe their child is a good problem solver, understands what he/she reads, and is quite creative (See Table 2). Most students also see themselves in the same way (See Table 1). Parents and students differed the most in the area of 'staying on task'. Eighty percent of the students feel they complete everything they start compared with 60% of the parents. The parent figure correlates well with their opinion of their child's attention span. Fifty-three percent of parents feel their child has only an average attention span, 7% even shorter, and only 40% believe their child has a long attention span.

The teacher/researcher also conducted a survey using an observation checklist and found that there were discrepancies between her findings and the perceptions parents have of their children. The teacher saw only 31% of the children as always on task, with 25% on task some of the time, and 44% rarely on task. The creativity displayed at this point was also very low compared with parent expectations. The teacher/researcher saw 44% of the class showing creativity to some degree with only 6% at a high degree. Likewise, problem solving skills are not yet developed in these elementary students and critical thinking skills are slow in appearing.

The teacher/researcher feels there is a definite lack of understanding in content areas as displayed by students inability to solve problems, stay on task, and use higher order thinking. Parents put a lot of pressure on their children to do well, but are mainly concerned with the A+ on the paper or test and not with whether or not the child can transfer his/her learning to everyday life.

School B

Students at the junior high level often experience difficulty in transition from elementary school to the seventh grade. This becomes intensified if they have not acquired the skills they are expected to possess upon entrance. The teacher/researcher suggests that there may be a connection between basic computation ability and proficiency at problem solving and critical thinking. To test this hypothesis, baseline data was collected by means of a multiplication skills' test. Students were given two minutes to complete fifty single-digit multiplication problems. This should constitute sufficient time, since this material has been taught in earlier grades and is considered to be prior knowledge for seventh graders.

Results indicate that many students have yet to master this basic skill. Less than 25% of students achieved a perfect score. If the school grading scale of 90-100% = 'A' was used, over one-third of the class answered less than the minimum of 45 correct to get an 'A.' Of this number, 24% of the students scored a 'C' or lower (less than 80% correct), making more than ten errors. This was exactly the same number of students that received a perfect score. Clearly, students are experiencing difficulty with supposedly familiar and fundamental material. This may be part of the reason for their deficiencies in critical thinking skills and problem solving.

Student response, to the survey question regarding understanding, shows that over one-third do not always comprehend what they read. Parent answers were even more alarming, indicating that almost half of their children are lacking in reading comprehension. Such difficulty extends to the area of problem-solving, where only 36% of parents say that their child is good at problem solving. This figure seems to agree with the students' own perceptions of themselves about whether they keep working even if things seem hard. Only 39% of the students said that they would usually keep trying to solve these kinds of problems. Parents' opinions were somewhat higher, but still close to half did not think that their child would continue to work if the problem was difficult. In fact, only one in seven felt that their child's attention span was above average. Time spent on homework also seemed to fall below normal, with 60% of students spending an hour or less per night studying.

Parents and students seemed to differ most on the area of creativity. Over two-thirds (70%) of the students responded favorably when asked if they enjoyed creative activities. However, less than half of their parents thought that they were creative in many areas. To the researcher, it seems clear that there is an obvious deficiency in some of the more important abilities that students need to possess. These shortcomings quite likely have an impact on students' depth of understanding of what they are supposed to be learning.

School C

At the high school level, the parent and student surveys were given during the first week of school and were returned with generally positive replies. Regarding perseverance, 95% of the parents agreed that their children regularly stay on task until work is completed. However, in apparent contradiction, only 9% thought their children have long attention spans. Eighty-six percent said their children have an average attention span, and 5% reported a short attention span. On the other hand, 100% of the students believe that they stay on task until work is completed. According to teacher journal entries, however, perseverance is not as widespread among these students. According to these entries, what students tend to do is know the limit of the attention span and work within it. Thus the work output is there, but the quality of the work may not be as expected.

As for understanding, 71% of the parents feel their children almost always understand what they read and 29% answered that their children do this sometimes. There were no negative responses. The students were not as optimistic. Ninety-one percent of the responses were positive, however, 4.5% reported rarely understanding what they read, and another 4.5% admitted that this almost never occurs. Teacher journal entries show a discrepancy between parents' and students' perceptions and those of the teacher. The teacher feels that reading comprehension is not at the level of expectation. This is supported by poor oral and written responses to teacher questioning.

Parents were asked a question about their child's problem-solving abilities and the responses were less positive. Only 47% of parents thought their child solves problems well most of the time. Forty-two percent replied that this occurs sometimes. Eleven percent felt that their children rarely solve problems well. These responses show a need for work on these skills.

The questions on the remainder of the surveys that were not addressed here do not relate to the issue at hand. From the responses analyzed, it appears that both parents and students have an inflated view of students' skills in comparison with the teacher's views. This may be partly attributed to the fact that the survey was taken during the first week of school. At that time, students are not yet frustrated with school work. Also, during the first week of school, most of the material covered is review. Therefore, students are comfortable with the material being covered. Teacher experience shows, however, that students' ability to continue to persevere will drop off as the year progresses.

School D

At the high school level in school D, the teacher/researcher surveyed the parents of the students in the targeted class to elicit their feelings concerning the study habits of their children. Of the fifteen parent surveys that were completed, 100% of the parents answered positively that their child can stay on task until completion. They also all answered positively that their child enjoys reading and that their child understands what he or she reads. One hundred percent also indicated that their child was creative in many ways. Ninety-three percent indicated their child was good at problem-solving, however, 78 % of the positive responses answered "sometimes". Sixty percent of parents also indicated their child does do homework every night.

Of the twenty-three student surveys that were completed, 100% answered positively that they like to find out about things on their own. Ninety-six percent indicated that they like to learn and are generally curious about things. Sixty-one percent responded that they like to learn and are generally curious about things. Sixty-one percent responded that they enjoy reading, while 96% indicated that they understand what they read. Seventy-eight percent of students enjoy creative activities. Eighty-three percent responded that they keep working at things even if they seem hard. Sixty-one percent of students do some homework every night.

In addition to the objective questions on both surveys, the parents were asked to label their child's attention span as long, average, or short, and they were also asked to respond numerically to the amount of time their child spends on homework each night. The students were also asked to respond numerically to the amount of time they spend on homework each night. Eighty percent of the parents feel their child has a short attention span. In response to the amount of time spent on homework each night, 40% feel their child spends between zero and twenty-nine minutes on homework each night. Fifty-three percent stated that their child spends between thirty and fifty-nine minutes on homework each night. Of the twenty-three students surveyed, 65% responded that they spend between zero and twenty-nine minutes per night working on homework, while 35% responded that they spend between thirty and fifty-nine minutes per night on homework.

In analyzing the responses of both the parent and student surveys, it is the opinion of the teacher/researcher, based on experience, that the responses are not truly indicative of the students' study habits. The researcher believes that the majority of the parents answered honestly to the questions regarding their child's enjoyment of reading, their attitude toward writing, and the degree to which their child's peers influence their actions. However, the researcher feels that the answers to the other nine questions are either embellished or do not fit the researcher's understanding of the questions. Several possible factors may have direct effect upon this discrepancy. One factor, the researcher feels may play a role, is the fact that the survey was taken at the beginning of the school year. At the beginning of a school year when everyone has high hopes for what might be, the researcher feels that some parents may be too optimistic in responding to the survey questions. Another possible factor for the discrepancy may be the settings in which the parent and researcher observe the student to form their respective opinions. In other words, the researcher feels that the parents come to judge their child's abilities based on what they observe at home. They may possibly judge their child's ability to stay on task until completion or to be creative in many areas when their child is working on something which they have a high interest in such as a hobby or other project. Whereas, the researcher bases his opinions of those same issues observing the students in his classroom working on tasks, in which the student may not have a high interest, such as reading a particular novel or completing a research project from start to finish A third possible cause for the discrepancy, according to the researcher, may be a direct attempt by the parents to influence the opinion of the teacher/researcher by creating a very positive picture of their child

The researcher also believes that the majority of students surveyed responded honestly to the questions regarding their attitude toward reading, their attitude toward writing, their ability to work with numbers, and the degree to which they are influenced by their friends However, like the parent responses, the researcher feels that the answers to the other eight questions were slightly embellished The main cause for this embellishment, according to the researcher, is that the students are excited at the beginning of the school year, however, they may not be as eager to learn as the year unfolds Another possible cause for the embellished answers may be the fear of answering honestly to the teacher/ researcher who the students know expects a great deal from them in the classroom

In conclusion, at the middle and high school levels, data show that few parents consider their children to be good problem solvers, suggesting that there needs to be a focus on higher-order thinking skills and problem-based learning However, respondents at the elementary level were much more optimistic about their child's abilities to understand and solve problems, which can mean either that the children experience more success early in school, or that they are not accurately judging what they can do Other questions addressed by the surveys resulted in answers which varied from school to school Therefore, conclusions drawn from this data are site specific and must be understood and responded to in context

Probable Causes

Students' obvious lack of depth of understanding in many different content areas is a complex problem that can be attributed to many different sources. Students' lack of understanding in the research sites can be traced to two problems present in the sites themselves: curriculum overload and lack of home study routine. Teachers feel pressed for time because the administration and school board require that all units or chapters in all subjects are covered. This poses severe time constraints. In an attempt to cover all of the material in the course of the year, reteaching techniques and opportunities for project work and in-depth research are foregone. Lack of home study routine is also a problem. Students rarely spend as much time as teachers suggest on their studies nightly. Instead, they concentrate only on finishing what assignments must be done for the next day and not actually studying material to understand it or to prepare for quizzes and tests. Consequently, concepts are rarely retained for real-life application.

Going beyond the site-based causes of students' lack of understanding, a review of the professional literature on the subject was completed. This research developed three main categories in common: curricular issues, teacher instructional practices, and assessment strategies.

Many districts have mandated curricula that place demands on teachers to cover specific areas of their subject within a given time frame (Perrone, 1994). Coupled with a distraction-filled calendar, this often leaves little time for teachers to engage students in activities that promote understanding: reflection, communication, investigation, debates, etc. (Unger, 1994). Costa and Kallick (1992) contend that "Our obsession with content is what holds us back" from considering thinking as the core of the curriculum and teaching for understanding (p. 279). While this certainly has an element of truth, it can be misconstrued that factual knowledge is a waste of time. Such is not the case. "Foundational knowledge is almost never sufficient for advanced competence, but it is always essential" (Stiggins, 1995, p. 240). Put simply, in order for students to understand something, they must first possess some knowledge about it. These are not mutually exclusive -- a balance must be achieved.

Unfortunately, what is needed is often found in short supply -- time. Student understanding is not something that can occur instantly. Deep comprehension is always developing, and needs to be cultivated continually, but teaching for understanding requires time. School schedules often place severe limitations on this commodity, with 45-minute periods, standardized testing and other variables that steal valuable instructional time. Not only do teachers need more class time to incorporate activities that foster greater understanding, they must be provided with time and opportunity for professional development (Stiggins, 1995). Most teachers' initial training and ensuing experiences have not provided a depth of technique required for teaching for understanding (Perkins & Blythe, 1994). However, caution must be used. Studies have shown that without careful planning and sufficient resources, the primary response to additional time is to slow down the pace of instruction and spread out what is being taught, eliminating any potential benefits (Adelman & Pringle, 1995). Of course, anything that requires additional time and resources will cost money (Kane & Khattri, 1995). If we want our students to gain deeper understanding, we must be willing to pay the price.

When it comes to pointing fingers at the causes for students' lack of understanding, teachers are often the primary target. While this is certainly not fair to everyone in the profession, part of the blame may lie with some teachers who continue to practice the same methods that are not working. One reason for students' failure to comprehend subject matter is lack of interest. This may be a result of how the teacher presents the material, or to the material itself. If teachers always lectured in a monotone and rarely varied their style of instruction, students would likely be bored and disinterested (Rudner, 1997). In 1994, Brandt said, "[Teachers] talk a lot in classrooms but they don't always pay careful attention to whether the talk is being understood" (p. 26). Also, it is critical for teachers to choose generative topics that are rich with meaning and connections to students' lives (Unger, 1994). While the overall content of the curriculum may be predetermined by forces outside a teacher's control, the order and manner of presentation are typically left to individual choice. How teachers approach this has a profound impact on the understanding of their students.

An analysis of how teachers teach shows that there is often an overemphasis on routine and discrete skills, with a neglect of complex thinking and problem solving skills (Herman, Aschbacher, & Winters, 1992). Students are rarely asked or required to generalize, find new examples, carry out applications, and transfer their knowledge to new situations (Perkins, 1994; Dietel, Herman, & Knuth, 1991; Herman et al., 1992). Consequently, their responses to teacher questioning and on assessments consist of fragments of information that they are unable to transfer and apply. Their knowledge seems to exist in isolated units, rather than as an integrated whole. They can describe, but fail to exhibit the ability to analyze, evaluate, and synthesize -- higher-order thinking skills (Pallrand, 1996). Thus, teachers need to develop activities that promote these kinds of deeper understanding and explicitly teach the skills they want students to acquire.

Likewise, when it is time for teachers to assess their students' understanding, the format is equally important. Not every kind of knowledge, particularly complex topics that require depth of understanding, can be adequately measured by the use of multiple-choice tests. Supposedly, the advantage of standardized testing is to improve instruction by identifying problem areas quickly and adapting accordingly. Instead, scores are used to compare schools on a state and national level, rather than to improve instruction and student performance (Cizek, 1995; Rudner, 1997). In order to look good, districts place emphasis on these tests and teachers feel the pressure to teach to the test. Unfortunately, this effort to increase scores to meet minimum competency standards came at the expense of higher-order thinking and problem-solving (Worthen, 1993). As Costa and Kallick (1992) put it, "What was educationally significant but difficult to measure was replaced by what was insignificant but easy to measure" (p. 278).

The object of assessment is to measure the students' level of understanding. But with many standardized tests, the cause of behavior is unaccounted for -- it is impossible to tell why students performed that way (Gardner, 1989). "A correct answer on a test does not assure that the student understands the material being taught," while an incorrect response is even more inexplicable (Phillips, Phillips, Melton, & Moore, 1994, p. 50). If we want to assess whether students are understanding what they are learning, we must ask them to apply their knowledge in unique and novel ways. "The most valid assessment of student understanding is to provide a problem situation the student has never seen before" (Phillips et al., 1994, p. 52). Traditional measures are often punitive in nature and fail to assess authentic and significant learning outcomes (Dietel et al., 1991; Kallick, 1992).

To make learning meaningful for students, teachers need to specify the criteria and standards for assessment at the beginning of each unit. Of course, this will be difficult if teachers have not developed and clarified their own goals of instruction (Wiske, 1994; Unger, 1994). The attitude that tests are given only at the end of each chapter must also be reevaluated. Students are not being given the opportunity for reflection throughout the learning process, as well as chances for peer and self-assessment (Perkins & Blythe, 1994; Simmons, 1994). Assessment has come to be viewed as a separate process from learning, rather than an integral part of it. In order for students to learn from their mistakes, they must be made aware of them and given direction on how to correct them. Doing the former without the latter is frustrating to the student and, therefore, counterproductive.

To summarize, the following reasons are some of the more important probable causes for students' failure to achieve depth of understanding:

1. School districts have mandated curricula that place emphasis on subject coverage and detract from activities that promote understanding.
2. There is a lack of classroom instructional time and opportunity for professional development to foster teaching for understanding.
3. Students are disinterested in subject matter that is not meaningful and connected to their lives.
4. Teacher presentations are lecture-oriented and always the same style.

5. There is an overemphasis on routine and discrete skills with a neglect of higher-order thinking and problem-solving.
6. Teachers fail to require students to apply their learning and transfer to new situations.
7. Traditional and standardized tests do not adequately measure what students know and are able to do.
8. Students are not made aware of the criteria and standards of assessment prior to instruction and are not provided time for reflection and peer review to correct their mistakes.
9. There is a separation of assessment from the learning process.
10. Students do not have good home study habits.

CHAPTER 3

THE SOLUTION STRATEGY

Literature Review

An in-depth examination of the professional literature regarding the lack of student understanding suggests that the problem is not a simple one that has a unique cure. Rather, it will involve a fundamental change in thinking about the learning process. "No longer is learning thought to be a one-way transmission from teacher to students with the teacher as lecturer and students as passive receptacles" (Herman, Aschbacher, & Winters, 1992, p. 12). Thus, for any intervention to have a chance at success, it must first deal with the methods being used for instruction. However, simply revising current instructional strategies is insufficient to completely correct the problem. New and better ways to determine whether or not students are understanding what they are supposed to be learning must also be found. This can be done by making assessment an ongoing process and practicing alternative means of assessment.

Many authors have tackled the problem of students' lack of understanding from the point of view that teachers should implement certain instructional strategies in their classrooms. Those that are discussed here include cooperative learning, teaching higher-order thinking and problem-solving skills, providing opportunities for transfer, and interdisciplinary work. These strategies can be used independently of each other or combined for maximum effect.

Professional literature suggests the use of cooperative learning strategies as one way to promote students' depth of understanding. For example, Bellanca (1992) describes cooperative learning as a way to develop each student's capabilities as a critical and creative thinker while working toward thoughtful results. It has also been suggested that cooperative learning helps to develop problem-solving skills. By working together a problem can be considered from multiple perspectives (Characteristics of..., 1995). Students working in groups are also actively engaged in making and critiquing their own knowledge and that of their classmates (Wiske, 1994). As a frequently used instructional strategy, cooperative learning facilitates learning in several ways. Students can model and practice effective thinking strategies together. They also have the opportunity to provide mutual constructive feedback. Cooperative learning also helps students value the elements of critical thought (Dietel, Herman, & Knuth, 1991). As an instructional strategy, cooperative learning seems to be worthwhile and relatively simple to incorporate into the classroom.

Understanding can be defined in many ways. Brandt (1994) defines it as making sense out of what one is studying and being able to explain your ideas to others. Perkins (1994) explains that "understanding a topic of study is being able to perform in a variety of thought-demanding ways with the topic -- to explain, muster evidence, find examples, generalize, apply concepts, analogize, represent in a new way" (p. 1). Because of these definitions, these and other knowledgeable authors have chosen to promote students' depth of understanding by creating classroom activities that require and develop higher-order thinking skills, problem-solving skills, and transfer.

Past and present assessment practices hinder the use of higher-order thinking skills. "Narrowly focused tests that emphasize recall have led to a similar narrowing of the curriculum and emphasis on rote memorization of facts with little opportunity to practice higher-order thinking skills" (Dietel et al., 1991, p. 2). Since assessment dictates instruction and because of the format of tests, teachers have students practice selecting the best answer instead of inventing their own questions or answers (Dietel et al., 1991). These multiple-choice tests lead students to believe that there is one right answer to everything. However, in real life there are situations in which there is more than one answer, or no right answer at all (Institute for the Learning Sciences, 1994). Sadly, in many classrooms, there is little teaching of debatable points or use of open-ended questions (Institute for the Learning Sciences, 1994). For change to take place so that higher-order thinking skills are developed, instruction and assessment will need to change.

Instruction must foster higher-order thinking. Brandt (1994) believes that teachers must use questioning techniques that force students to question their own assumptions and monitor class discussions so that students can challenge each other in safe ways. Teachers must create a classroom environment in which students feel safe to express their thinking (Ellsworth & Sindt, 1994). Teachers must also help students with metacognition by aiding them in seeing connections in their own ideas and justifying and clarifying their own thinking (Brandt, 1994; Ellsworth & Sindt, 1994).

Assessment is also a key to enhancing higher-order thinking skills. First, assessment devices that tap higher-order thinking skills will elicit instructional strategies that emphasize and develop higher-order thinking skills (Guskey, 1994). Also, because being skilled no longer means simply knowing facts, but being able to apply and use knowledge teachers must choose assessments that measure the application and use of knowledge (Herman et al., 1992). This leads to the use of alternative assessment. Since learning is so complex, the means needed to assess learning fully and fairly are diverse (Guskey, 1994). Alternative assessment can measure complex, higher-order abilities that are difficult or impossible to measure with standardized testing. According to Baron & Wiggins (as cited by Characteristics of..., 1995), good alternative assessments would require students to justify their assumptions, predictions, estimates, and conclusions. They would also require students to process information: decide what data is needed and collect, report, and analyze the data to find relevance and reliability (Characteristics of..., 1995). However, if we expect students to improve thinking skills by using alternative assessment, teachers need to engage in performance-based instruction. Pairing instruction and assessment with an emphasis on performance places "greater emphasis on problem-solving, comprehension, critical thinking, reasoning, and metacognitive processes" (Miles, 1991, p. 1).

Next to higher-order thinking skills, problem-solving is another important area in which skills are necessary in the real world. Instruction of problem-solving skills can take many forms. Perrone (1994) believes that teachers need to set goals that will promote skills that will encourage students to handle multiple points of view, and be able to pose and solve problems. Ellsworth & Sindt (1994) adds that it is important to challenge students to find alternative solutions for problems they have already solved. A very direct approach is introduced by McTighe (1996-1997), which is to teach problem-solving strategies explicitly. Some strategies may include, but are not limited to, webbing and mapping, brainstorming techniques, and mnemonics. McTighe (1996-1997) proposes a five-step process:

1. Introduce and explain the purpose of the strategy.
2. Demonstrate and model its use.
3. Provide guided practice for students to apply the strategy with feedback.
4. Allow students to apply the strategy independently and in teams.
5. Regularly reflect on the appropriate uses of the strategy and its effectiveness. (p. 10)

Once students have been taught higher-order thinking skills and problem-solving skills, they must learn how to transfer these skills and other information and apply their knowledge to practical situations. Transfer is an important final step in the learning process. Bellanca (1992) suggests that once students demonstrate proficiency in using a skill, teachers provide opportunities for transfer. Also, Perkins (1994) believes that teaching for a full, rich understanding needs to include understanding performances that reach well beyond the obvious boundaries of a topic. Finally, Herman et al. (1992) stress that teaching students basic skills separate from giving them the opportunity to apply the skills does them a great disservice. Obviously transfer is an important and valued part of learning. Therefore, it should be integrated into instruction. Teachers need to identify skills, concepts, and attitudes for transfer. They should then channel the transfer of learning within the content area being taught to real-world situations and possibly other disciplines. It would be beneficial to make students aware of transfer. Fogarty (1992) believes this makes students feel more accountable to use transfer and to use new ideas. Students will then be more likely to look for and attempt transfer on their own.

The preceding discussion of transfer leads to a related concept -- interdisciplinary study. McTighe (1996-1997) stresses its importance in enhancing understanding. "Because real-world issues and problems are rarely limited to a single content area, authentic work often provides opportunities for making interdisciplinary connections" (p. 9). Gardner and Boix-Mansilla (1994) suggests that teachers need to help students understand that skills vary across the disciplines, that disciplines are means for answering generative essential questions, and when students have been exposed to interdisciplinary work, they are in a better position to arrive at their own answers. Assessment also has a role in interdisciplinary work. Alternative assessment should "result in products or performances that integrate or blend content, processes, attitudes and attributes" (Characteristics of..., 1995, p. 1). This is analogous to the purpose of interdisciplinary studies.

There are many ways in which teachers can promote students' depth of understanding. The preceding solutions -- cooperative learning, higher-order thinking and problem-solving skills, transfer, and interdisciplinary work -- concentrate mainly on instructional strategies. While changing the current methods of teaching is a necessary starting point for improving student understanding, it cannot stand alone. There must also be examination and revision of the ways in which students are being assessed in order to align what is being taught with the proper method of assessment.

A second part of this approach suggested by the literature to improve understanding focuses on the evaluation process. As the forms of assessment change from the traditional to alternative, it is important that the forms of evaluation change as well. It is believed that students benefit from being involved in the establishment of grading criteria. Perrone (1994) believes that students have been most engaged intellectually when they have helped define how they will be evaluated. When students have a role in setting up rubrics, they understand the grading criteria for themselves and then self-assessment or peer assessment can occur more easily. Students who have a role in the assessment process have been found to be able to evaluate their own strengths and weaknesses and decide how to go about improving their work. They see assessment as a positive tool for personal growth. When students are involved in this way, they have a greater feeling of ownership in the learning that takes place. Students will be motivated to stride toward standards they helped create (Stix, 1997).

There is also widespread agreement that students should clearly understand the grading criteria before assessment takes place, whether they are involved in establishing the criteria or not. Kallick (1992) states that expectations by which a project will be judged should be established before the students begin their project work. Simmons (1994) agrees, stating that making the standards for good work clear to all is imperative in a classroom. Students should know from the start the standards they are working toward. By knowing the standards up front, students can gauge their own understanding and will not be surprised by the grades they earn. McTighe (1996-1997) believes establishing clear standards is important because "students' attitudes and perception toward learning are influenced by the degree to which they understand what is expected of them and what the rationale is for various instructional strategies" (p. 8). To teach effectively, we need to set clear standards as to what we want students to understand and be able to do as a result of our instruction. Jeroski (1992) believes that evaluation enhances learning when it is collaborative and purposeful. When students are aware of the process it relieves unnecessary anxiety that inhibits learning.

It is also important that students are made familiar with the goals of an entire unit, not just how they will be evaluated on a particular assignment. Unger (1994) states the goals of the unit study need to be shared with the students for greater understanding. Students will then not need to create reasons for what they are doing or try to figure out what the teacher wants them to be able to do. Unger adds, "Having the standards of assessment from the very beginning of the unit to the very end is important" (p. 10). Perrone (1994) suggests that teachers can put the goals of a unit on the board to assure that the students and the teacher can measure what they do against them. He also advises teachers to encourage their students to ask questions such as, "What does this have to do with understanding more about ...?" Unger (1994) concurs, suggesting that teachers share with their students what they are going to ask them and why. Teachers should encourage the students to ask why they are doing these things. If the teacher can't answer why, there is a problem.

Many educators also believe in the importance of providing students with models of performance to assist them in achieving desired learning. McTighe (1996-1997) states that when students have the opportunity to examine their work in light of publicized standards and criteria, they change their focus from what grade they got to improving their work. If we expect students to do excellent work, they need to see what excellent work looks like. Checkley (1997) states, "when we share expectations with students up front, when we show them exemplars, students have a model for what we are asking them to do" (p. 5). There are benefits to establishing clear, specific criteria before work is started. Researchers have reported that when the scoring criteria are written specifically for the proficiencies being assessed, independent teacher judgments exhibit a high degree of agreement. When the proficiencies being evaluated are clearly identified and the scoring criteria are specific for those proficiencies, outcome-based performance assessment offers definite promise as an alternative to traditional forms of classroom assessment (Baron & Boschee, 1996).

A larger part of the evaluation process of student work falls on the development of rubrics. A scoring rubric consists of a fixed scale and characteristics describing performance for each point on the scale (Marzano, 1994). Because most performance-based tasks attempt to assess multiple domains of knowledge or skill, rubrics are used to score these assessments (Kane & Khattri, 1995). An example of a rubric that could be used to evaluate outcomes of a report might have a four-point scale such as: 1 - not yet, 2 - developing, 3 - achieving, and 4 - extending (Sperling, 1994). In general, outcome-based performance tasks that have rubrics written specific to the proficiencies assessed can be scored quite reliably (Marzano, 1994). Once a task is constructed, rubrics are designed for the various proficiencies embedded in the task. As is the case with most real-world tasks, performance tasks do not have a single correct answer (Marzano, 1994). To insure that a test is valid, the rubric must measure what it is intended to measure (Dietel et al., 1991).

Once students have been provided with, and perhaps been involved in the establishment of, clear grading criteria prior to beginning work on a task, and specific rubrics have been set in place to evaluate that work, the research suggests the teacher should provide the students with timely feedback on their work so that changes can be made if the need exists. To improve student performance, assessments must make students active skilled users of assessment information. Students must know how well they are performing on the full range of what is considered important for them to know and be able to do (Jamentz, 1994). Unger (1994) states that teachers need to provide feedback throughout ongoing assessment. The students' work must be judged against clearly articulated public criteria. Checkley (1997) does not feel students should receive a grade assigned at the end of a task, but rather continual feedback should be provided throughout so students' work is meaningful. Waters, Burger, & Burger (1995) also see the need for more self-directed, accurate feedback. "Students know exactly what is expected of them and where they stand in relationship to standards which helps them focus on continuous improvement" (p. 39). They also feel that students should be given the opportunity to demonstrate mastery along the way, not just at the end of a unit or project. Scores should be relayed immediately, and students should be compared to a standard (rubric) and not a norm. In summary, to learn effectively, students need criteria, feedback, and opportunities for reflection from the beginning of any sequence of instruction. Occasions of assessment should occur throughout the learning process from the beginning to the end (Perkins, 1994).

Simply providing students with timely feedback on their work from the beginning to the end of a unit of instruction only goes half way in improving their depth of understanding. The literature reviewed indicates that students must also be given ample opportunities for self-assessment as well. Self-assessment is the vehicle that allows the student to reflect on where they are presently in relationship to where they are going with regard to the standards that have been set for them. Perrone (1994) states that students need to regularly make judgments about their own progress as learners or the assessment activity is useless. Baron (as cited in Characteristics of..., 1995) agrees stating that worthwhile performance assessments should encourage students to take responsibility for their own learning. The students should be able to monitor themselves and think about their progress in order to determine how they can improve. Simmons (1994) states, "Taking time and energy to reflect on and improve one's work are essential to the understanding process itself" (p. 23). Metacognition is the means to student self-assessment. Swartz & Perkins (as cited by Burke, 1994) define metacognition as, "becoming aware of your thought processes in order to then control them when appropriate" (p. 97). The research finds the three most effective forms of metacognition are reflections, learning logs, and journals.

Students need to self-reflect regularly so that they can become adept at monitoring, assessing, and improving their own performances and their own thinking. Individual students, cooperative groups, and teachers need to take the time to process what they have done and internalize metacognitive strategies. The second form of metacognitive self-assessment are learning logs. Learning logs usually consist of short, more objective entries that contain mathematical problem solving entries, observations of science experiments, or anything that lends itself to keeping records. The responses are brief, factual, and impersonal. The third form of metacognitive self-assessment are journals. Journals are written in narrative form, are more subjective, and deal more with feelings, opinions, or personal experiences. They are often used to respond to pieces of literature, describe events, comment on reactions to events, reflect on personal experiences and feelings, and connect what is being studied in one class with another class or life outside the classroom (Burke, 1994).

Whatever the form, the positive outcomes of metacognitive self-assessment are well documented. Burke, (1994) states, "In order to transfer knowledge or skills from one situation to another, we must be aware of them; metacognitive strategies are designed to help students become more aware" (p. 97). Journals, thoughtful questioning, goal setting, problem-based learning, and self-assessments can help make students become more aware of their thought processes and, therefore, more able to transfer these strategies to real-life situations. Finally, Jamentz (1994) states that we want students to make the transition from being proud of a piece of work because it is their favorite to being proud of a piece of work because it has specific qualities. Students then must receive feedback both on their work and then their self-evaluation of that work.

In order to accomplish the goal of improving student depth of understanding, changes need to be made in instructional strategies and evaluation, but changes also need to be made in regard to how teachers assess student performance. In the 1990's, the value placed on traditional forms of testing has been de-emphasized and more emphasis is being placed on alternative forms of assessment. Alternative assessment moves away from the traditional multiple choice, standardized achievement test and focuses more on direct examination of student performance on significant tasks that are relevant to life outside of school (Worthen, 1993). Costa & Kallick, (1992) state that innovative assessment methods (writing, material manipulation, portfolios, performances, and exhibitions) are more useful than traditional testing for several reasons. They are more like real problem-solving situations; they allow teachers to better diagnose students' abilities; they take place during instruction rather than after; and they provide more immediate feedback so students can evaluate themselves. Simmons (1994) also connects understanding to student performance. "To teach for understanding requires that we attend closely to assessment. We cannot assume that because we have taught a lesson 'well', students have understood it. Rather, we have to seek evidence of understanding through student performance" (p. 22). Wiggins, (1990) agrees, stating:

> Do we want to evaluate student problem posing and problem solving in mathematics? Experimental research in science? Speaking, listening, and facilitating a discussion? Thoroughly revising a piece of imaginative writing until it 'works' for the reader? Then let our assessment be built out of such exemplary intellectual challenges. (p. 2)

One of the more heralded vehicles of alternative assessment is the student portfolio. Portfolios are collections of student work that may contain both polished and in-the-process pieces of writing, tapes of oral reading, math projects, learning logs, samples of work from content areas, journal samples, etc. (Hill & Ruptic, 1994). The goal of portfolios is to show student development. Portfolios must include student participation in selection of portfolio content, guidelines for selection, criteria for judging merit, and evidence of student reflection (Imel, 1993). Portfolios provide for student self-evaluation which is important for developing an effective collection. Students tell why they selected a piece and make further comments as desired (Jeroski, 1992). Frequently mentioned strengths of portfolio assessment include: learners share in the responsibility for assessing work, data are gathered and evaluated continuously over the course of a learning project, learners have an opportunity to learn about their own learning, and learners develop an expanded view of what is learned (Imel, 1993). Some benefits of portfolio use are discussed by Paulson, Paulson, & Meyer (as cited by Burke, 1994):

> Portfolios allow students to assume ownership in ways that few other instructional approaches allow. Portfolio assessment requires students to collect and reflect on examples of their work ... if carefully assembled, portfolios become an intersection of instruction and assessment; they are not just instruction or assessment but, rather, both. Together, instruction and assessment give more than either gives separately. (p. 46)

Another form of alternative assessment is the use of performance assessments. Performance assessment is testing that requires a student to create an answer or a product that demonstrates his or her knowledge or skills. It requires students to be active participants (Rudner, 1997). Burke (1994) also adds:

> The 'performance' aspect is what the students actually do: researching, writing, speaking publicly, participating in discussions, role playing in simulations, etc. The 'assessment' part evolves from activities and criteria which can be designed not only by the teacher but also by the teacher and students. (p. 56)

Performing a science experiment, defending the way students solve a problem, performing a music recital, giving a speech, and creating a newspaper are all examples of performance tasks where students exhibit what they can do. Delivering a speech about raising the driving age from 16 to 18 is more authentic than taking a multiple choice test in driver's education (Burke, 1994). Performance assessments will show students' strengths and weaknesses better, focus curriculum on critical thinking and multidisciplinary understanding, and lead to the use of new instructional practices that are more effective (Kane & Khattri, 1995). Performance assessments can also measure skills that have not traditionally been measured in large groups such as contributing to the work of a group and developing a plan of action when confronted with a novel situation (Rudner, 1997). Commonly, performance tasks are considered to have strong "face validity" which means that the assessment appears to measure what it is supposed to measure (Marzano, 1994).

Projects join portfolios and performance assessments as another form of alternative assessment. The project assignment allows students and teachers to learn together. The project allows students to formulate their own questions and then try to find answers to them. Projects provide students with opportunities to use their multiple intelligences to create a product. Teachers can assign projects at different levels of difficulty to account for individual learning styles and ability levels. Projects can be motivating to students and they provide opportunity for positive interaction and collaboration among peers. The project provides an alternative for students who have problems reading and writing and they increase the self-esteem of students who would not get recognition on tests or traditional writing assignments. The project allows for students to share their learning and accomplishments with other students, classes, parents, or community members. Finally, the project can achieve essential learning outcomes through application and transfer (Burke, 1994). Long term projects that produce real works should dominate the day rather than bits of knowledge imparted by the teacher (Perrone, 1994).

In order for the alternative assessments that have been referred to in this chapter to be successful, they must embody certain qualities. It is imperative that the topics for instruction generate an interest in the student population. It is also necessary to create activities with meaningful connections to students' lives so that all learning can be transferred to real-life situations. Finally, it is important that assessments match instructional content and align with student performance goals.

Teaching for understanding is more than just method, it is also a matter of content. When topics of study are chosen by the teacher many factors need to be considered. The topic must contain a rich array of genuinely meaningful connections to students' lives; it must be central to an understanding of the discipline; it must be accessible to students; and it must connect to diverse topics both within and out of the discipline (Unger, 1994; Perkins & Blythe, 1994). Teachers need to rethink many of the topics that they currently teach. Are the topics generative? Do they make connections to the students' lives? And will the students understand the reasons for learning the subject? When teachers contemplate the topics that will be taught they need to consider which ones will be most likely to engage the students in genuine learning, which ones will hold student interest, which ones will promote questions that the students have about the world around them, and which ones draw out the issues that students confront in the real world. When the teacher finds such a topic, that is the one that has generative quality (Perrone, 1994).

Students are most engaged intellectually when they are given time to think about a particular direction that interests them. Perrone (1994) states that the teacher must "formulate generative topics -- those ideas, themes, and issues that provide the depth and variety of perspective that help students develop significant understandings" (p. 12). A generative curriculum must connect to students' interests and also to their prior knowledge and be created to help students detect and develop those connections (Wiske, 1994). The teacher needs to ascertain the kinds of activities that the students will take an interest in and also find ones that the students will understand a need for in their lives. It is almost impossible to persuade students to put forth effort to learn when they have little or no interest in what is being taught (Juarez, 1996). Teaching within and across subject matters, in ways that highlight powerful conceptual systems, will produce a curriculum that empowers learners for the complex and challenging future (Perkins & Blythe, 1994). When assessment is attached to generative topics, the assessment task must also be placed in a context that will hold student attention. It is important that students understand the purpose of the assessment and make sense of the content (Baker, 1994).

One good way to understand content is to relate it to situations outside the classroom. Real life seems to be the key to developing performance assessments and generative topics. Perrone (1994) says, "All teaching should be aimed toward something students can hold on to beyond the Friday test, the final exam, and school itself" (p. 11). The teacher should try to think of other ways that the content can relate to the students' personal lives. When using alternative assessment, it should reflect real as opposed to artificial events. A real-life context must accompany any desired behavior (Hill & Ruptic, 1994). Worthwhile performance assessment should put students in real-world situations similar to those they will encounter in their adult life; it should allow for student choice whenever possible; and it should result in projects, products, or performances that are of high interest and value to students (Characteristics of..., 1995). Because the world's knowledge base is growing so rapidly, it is impossible to keep up; therefore, students need to be able to access and use information (Herman et al., 1992). Hence, effective assessment should be meaningful and prepare students for employment in the real world (Waters et al., 1995). It should not be just a regurgitation of facts presented in class. Alternative assessment must provide information about students' ability to analyze and apply information -- it must reflect their ability to think. Traditional forms of assessment only assess recall or recognition of facts. They do not reflect real-life challenges. Learning objectives in specific content areas must be discarded in lieu of objectives that reflect more realistic life-roles (Marzano, 1994). Material is most effectively internalized when it is learned in a way that connects it to a relevant use (Stiggins, 1995). McTighe, (1996-1997) says, "Performance tasks should call upon students to demonstrate their knowledge and skills in a manner that reflects the world outside the classroom" (p. 8).

The purpose of assessment is to find out where each child needs help. If a child does not pass a test, does that mean he gets a failing grade? It should only mean that he needs more instruction in that area to meet the standards. Information acquired by assessment must be used to further the learning of the students. It should be used as a diagnostic tool to help the teacher discover how best to help the child succeed, not just as a means to make a judgment of student achievement when issuing a grade (Juarez, 1996). Therefore, in order to select or design any assessment strategy, it is necessary to determine the content. Worthwhile performance assessments are based on defined content standards, and must allow students to demonstrate their ability to perform, regardless of socioeconomic status, cultural background, or learning style (Characteristics of..., 1995). Curriculum, instruction, and performance assessment, must all be organized around and matched to the content and the full range of desired outcomes and goals ("Match Assessments...", 1997). The following table (Marzano, Pickering, & McTighe, 1993, as cited by "Match Assessments", 1997) shows which form of assessment is most appropriate for specific types of content. It compares the use of alternative assessments or performance assessments to more conventional multiple-choice and short response assessments.

When to Use Alternative Assessment

Types of Skills	Multiple-Choice, Short Response	Performance Assessment
Process Skills: Simple	Long division Punctuation, grammar Decoding words	
Process Skills: Complex		Problem solving Writing Setting up an experiment Critical thinking Group cooperation Lifelong learning Dance
Content/Declarative Knowledge: Simple	Recall facts (e.g. date, places, events)	
Content/Declarative Knowledge: Complex		Concepts (e.g. democracy generalizations – "power corrupts")

Table taken from
Marzano, R., Pickering, D., McTighe, J. (1993). Assessing student outcomes: Performance assessment using the dimensions of learning model. Alexandria, VA: Association for Supervision and Curriculum Development.

Marzano et al. (as cited by "Match Assessments...", 1997) contend that in order to test complex declarative knowledge the teacher must: decide how students will apply the knowledge; how students will report the results of the application; and develop performance criteria on the content and also the quality of the application and the quality of the product. So, determining content is an essential first step in the selection or design of any successful assessment strategy.

Alternative assessment, therefore, must stem from generative topics that are both teacher and student selected; it must be linked to meaningful real-life activities; and it must match instructional content and performance goals. Worthwhile performance assessment requires students to stretch their thinking. "The task should stimulate students to make connections and generalizations that will increase their understanding of the important concepts and processes" ("Characteristics of...", 1995, p. 1).

In summary, students' lack of understanding is a complex problem that calls for changes in how teachers both present and evaluate their subject matter. They need to be examining what they are teaching to see if students understand the need for it in their lives. Likewise, their methods of assessment should require students to develop and practice skills that will transfer beyond the walls of the classroom. It is impossible, for teachers and students alike, to expect complete understanding of everything. Pallrand (1996) cautions, "It may be necessary to sacrifice some curricular breadth in exchange for additional depth" (p. 318). However, such a sacrifice is acceptable when taken in light of the goal -- to improve students' depth of understanding of content.

Project Objectives and Processes

As a result of implementing an alternative assessment program, during the period of August 1997 to January 1998, the second, seventh, tenth, eleventh, and twelfth grade students from the targeted classes will increase their depth of understanding of content, as measured by teacher observation checklists and journal entries, and student reflections and content evaluations.

In order to accomplish the project objective, the following processes are necessary:

1. Create activities that require higher-order thinking with an emphasis on problem-solving skills.
2. Provide students with clear criteria and standards for alternative assessment prior to instruction.
3. Provide ongoing, alternative assessment throughout units of study with opportunities for student reflection.

Project Action Plan

I. Data Collection to Evidence the Problem

  A. Conduct parent and student surveys

  B. Complete teacher observation checklists

  C. Collect initial samples of student work

  D. Analyze student reflections

  E. Analyze student content evaluations

  F. Complete teacher journal entries

II. Intervention: Revision of Instructional Strategies Focusing on Higher-Order Thinking, Problem-Solving, and Cooperative Learning

A. What will be done?

1. Create lesson plans that include activities that practice the use of higher order thinking
    a. Use graphic organizers
    b. Practice metacognition
    c. Use high-level questioning
2. Create lesson plans that include the learning and practice of problem solving skills
    a. Brainstorming
    b. Make a diagram/picture
    c. Organize a list
    d. Work backward
    e. Make a model
3. Create cooperative learning opportunities to work on higher-order thinking and problem-solving skills
    a. Task groups of 3-4
    b. Heterogeneous groupings
    c. Teacher-selected

B. When

1. At least one activity per week
2. One class period (45 minutes) each time
3. Duration - sixteen week's

III. Intervention: Implementation of Alternative Assessments to Evaluate Student Understanding and Creation of Opportunities for Student Self-Assessment

A. What will be done?

1. Create clear alternative assessment criteria by the beginning of each unit and share with students
    - a. Design rubrics
    - b. Point-scale
    - c. Weighting

2. Choose an appropriate alternative assessment to measure students' depth of understanding of each unit of study
    - a. Portfolios
        - -collection of student work to assess progress
        - - items are teacher and student-selected
        - - provides for reflection
    - b. Performances
        - - role-playing
        - - speeches
        - - oral group presentations
    - c. Exhibitions
        - - essays
        - - artwork/posters/graphic organizers
        - - video presentations

d. Projects
- research
- play writing
- surveys and statistics

3. Provide students with self-assessment opportunities
   - a. Journals
   - b. Reflections
   - c. Learning Logs

B. When

1. Alternative assessments
   - a. At least once a week
   - b. One class period (45 minutes) each time
   - c. Duration - sixteen weeks
2. Student self-assessments
   - a. At least once a week
   - b. Ten minutes each time
   - c. Duration - sixteen weeks

IV. Data collection to Analyze Results of Plan Implementation

A. Complete teacher observation checklists

B. Collect samples of student work

C. Analyze student reflections

D. Analyze student content evaluations

E. Complete teacher journal entries

Methods of Assessment

In order to assess the effects of the intervention, teacher observation checklists and teacher journal entries will be completed. In addition, the effect on students' depth of understanding will be documented through analysis of student work samples, student reflections, student content evaluations, and portfolios. Finally, a post-intervention survey will be taken of parents and students that parallels the pre-intervention survey given to both groups.

CHAPTER 4

PROJECT RESULTS

Historical Description of the Intervention

The objective of this project was to increase students' depth of understanding of content. The implementation of alternative instructional strategies and ongoing, alternative assessments with opportunities for student reflection were selected to effect the desired changes.

Implementation of the action plan took many forms. The use of higher-order thinking, problem-solving, and cooperative learning were employed as instructional techniques in delivering subject matter content.

To address higher-order thinking skills, all four classrooms employed activities that stressed these skills on a weekly basis during the implementation. In the second grade classroom, thinking skills lessons were presented weekly for a duration of one-half hour each. Samples of these lessons can be seen in Appendix I. In addition, metacognitive techniques and graphic organizers such as the KWL, Venn diagrams, webs, and T-charts were utilized when applicable (Appendix M). In the seventh grade mathematics classroom, graphic organizers such as Venn diagrams, mind maps, and webs were used to help students organize their thinking. Students were also asked to use prior knowledge to make predictions about new material or to recognize patterns and make conjectures. The researcher in this setting also used a variety of questioning levels in order to strengthen students' thinking skills. In the tenth grade mathematics classroom, the material was designed to be learned through investigation. The students used higher-order thinking skills to find patterns or relationships in their work and made conjectures about what they found. The researcher also used tree and Venn diagrams to help students categorize and make comparisons between various geometric shapes (Appendix X). Other graphic organizers were utilized to help students express their prior knowledge and make predictions about various topics. In the twelfth grade English classroom, the researcher used a variety of questioning levels in discussion of literature at least once per week. Venn diagrams, PMIs, and mind maps were also used to foster higher-order thinking. These activities were incorporated into lesson plans to practice the use of higher-order thinking.

Lesson plans were created to include the learning and practice of problem-solving skills. In the second grade classroom, logic puzzles were used weekly. Sample logic puzzles can be seen in Appendix J. In addition, a variety of story problem solving strategies and think-aloud techniques were introduced. In the seventh grade mathematics classroom, students solved problems by drawing diagrams, listing possibilities in table form, using objects to model situations, and working backwards. In the tenth grade mathematics classroom, students modeled real-world situations and used these models to solve problems such as budgeting for house repairs based on surface area. In the twelfth grade English classroom, problem-solving activities were incorporated into cooperative learning lessons. These are many of the strategies used to teach problem-solving skills.

Cooperative learning opportunities were employed during the intervention to facilitate the aforementioned higher-order thinking and problem-solving skills. In the second grade, tenth grade, and twelfth grade classrooms, cooperative learning base groups were established during the first week of school and maintained throughout the intervention. Groups were teacher-selected and heterogeneous, consisting of three to four students. In the seventh grade mathematics classroom, task groups were utilized biweekly and during project work. Social skills lessons were presented on listening, teamwork, and respect for others. Cooperative learning, as utilized by the researchers, was intended to facilitate the acquisition of higher-order thinking and problem-solving skills.

The intervention also included the implementation of alternative assessments to evaluate student understanding and the creation of opportunities for student self-assessment. The implementation consisted of three parts. Clear alternative assessment criteria were prepared at the beginning of each unit and were shared with students. Appropriate alternative assessments were chosen to measure students' depth of understanding of each unit of study. Finally, students were provided with self-assessment opportunities.

All four researchers prepared assessment criteria in the form of rubrics for student self-assessment as well as teacher evaluation. Sample rubrics can be found in Appendices K. & DD. Each rubric specified the point-scale to be used for evaluation as well as how weighting of scores was transferred into a letter grade.

The use of alternative assessment, in various forms, occurred when deemed appropriate by the researchers throughout each unit of study. In the second grade classroom, portfolios were used to assess student progress. Items were teacher-selected and students organized and reflected upon their entries at the end of each month. In addition, in the area of science, research and model-making projects were assigned and oral presentations were required. In the subjects of math and social studies, performance assessments were used. Two sample performance assessments can be seen in Appendix L. In the seventh grade mathematics classroom, several projects were assigned that required students to collect and organize data. Students then made posters and other visual aids to present their findings and wrote essays to explain their conclusions. In the tenth grade mathematics classroom, portfolios were utilized to ascertain student progress and understanding of content. At the end of each chapter, students were required to add to and reorganize their portfolios. Student reflections followed each entry. Students also completed projects and exhibitions such as art projects, three-dimensional drawings, and computer-generated geometric designs. In the twelfth grade English classroom, students maintained portfolios designed to show growth and development. The final portfolio included fifteen to twenty student-selected artifacts with a one page reflection to accompany each artifact. Students also completed and presented three projects from a teacher-provided list for the major works of literature covered in the semester. In addition, students produced a minimum of six essays including a research paper. Finally, each student performed two public speaking assignments. Although alternative assessments were not implemented as often as stated in the action plan, they still constituted a major part of the intervention.

Students were also provided with several opportunities for self-assessment throughout the intervention. In the second grade classroom, students wrote journal entries two to three times per week. Reflections were done monthly on portfolios and also preceding and following each unit of study. Students used rubrics with each project for self-assessment and also completed a self-assessment evaluation form (Appendix H). Lastly, students completed a survey designed to allow them to reflect on their progress prior to both fall and winter parent-teacher conferences.

(Appendix M). At the beginning of the school year in the seventh grade mathematics classroom, students were asked to reflect on their previous math experience. Also, at the beginning and end of each quarter, students set goals and reflected upon their progress toward achieving them. In the tenth grade mathematics classroom, students reflected on the work included in their portfolio. They were also asked to complete content evaluations at the conclusion of applicable projects (Appendix G). Lastly, after each problem-solving situation, students evaluated their problem-solving skills and reflected upon how they could improve. In the twelfth grade English classroom, students completed three journal entries per week for the first six weeks of the semester. They also completed a minimum of fifteen reflections, one for each artifact included in the portfolio. In addition, students completed PMIs for self-evaluation of a videotaped speech performance and a cooperative group bonding exercise. Students were given time to assess their own learning frequently during the intervention process.

Presentation and Analysis of Results

In order to assess the effects of alternative instructional strategies and ongoing, alternative assessment combined with student self reflection on the students' depth of understanding of the content areas, a variety of measurement instruments were maintained throughout the intervention. Pre-intervention surveys of students and their parents were given in all four targeted classrooms the first week of school to determine baseline data (Appendices B & D). Teachers recorded weekly observational checklists throughout the intervention (Appendix F). In each of the four settings researchers collected and analyzed student work samples, student reflections, student content evaluations (Appendix G), and student portfolios. In addition each researcher completed weekly journal entries. Post-intervention surveys were also conducted of both the parents and the students at the second grade level. (Appendices C & E). A detailed presentation and analysis of data collected by the researchers in their respective settings follow.

School A

The researcher in the second grade classroom of School A analyzed data from parent and student surveys, observational checklists, work samples, content evaluations, portfolios, student reflections, and journal entries. These data as presented below will show evidence of increased depth of understanding in the second grade students.

Parent surveys were conducted both before and after the intervention. The data accumulated are presented in Table 3.

Table 3

Percentages from Parent Surveys Before and After Intervention n = 12

	Before				**After**			
Question: Does your child:	Most of the time	Sometimes	Rarely	Never	Most of the time	Sometimes	Rarely	Never
Stay on task until completion?	67	33	0	0	67	33	0	0
Seem to want to learn curious about things	83	17	0	0	92	8	0	0
Make free time choices independently?	50	42	0	8	50	42	0	0
Like to read?	50	50	0	0	83	17	0	0
Understand what he/she reads?	75	25	0	0	75	25	0	0
Like to write?	58	33	8	0	75	25	0	0
Show creativity in many areas.	67	33	0	0	83	17	0	0
Seem good with numbers?	67	33	0	0	33	67	0	0
Seem good at problem solving?	75	25	0	0	42	50	8	0
Seems easily influenced by his/her peers?	25	67	8	0	25	50	25	0
Do his/her homework every night?	100	0	0	0	100	0	0	0

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The intervention appears to have had positive effects from the parents' standpoint as the data shows all but one area either remained the same or improved. It is especially noteworthy that more parents felt their children like to read and to write following the intervention. Also there was a slight increase in signs of creativity and willingness to learn and investigate things. Parents did, however, lower their scores in the areas of numbers and problem solving. This is an interesting statistic because at the beginning of the year they felt their children were very good problem solvers. The researcher feels that the parents were probably more realistic at this point of evaluation. The researcher contends, as later data will confirm, that the students did improve in those areas as well.

Students were also surveyed prior to and following the intervention. The data gathered from those surveys are presented in table 4.

Table 4

Percentages from Student Surveys Before and After Intervention n = 15

	Before					**After**			
Question Do you	Most of the time	Sometimes	Rarely	Never		Most of the time	Sometimes	Rarely	Never
Like to find out about thing on your own?	20	60	0	20		47	53	0	0
Like to learn and are you curious?	53	33	7	7		73	20	7	0
Like to read?	53	27	7	13		73	13	13	0
Understand what you read?	47	33	20	0		53	47	0	0
Like to write	60	13	7	20		73	13	7	7
Enjoy creative activities?	60	27	7	7		87	7	7	0
Like math and working with numbers	53	33	0	13		53	40	0	7
Keep working at things even if they seem hard?	80	13	0	7		67	33	0	0
(Your) friends influence how you work in class?	47	20	13	20		40	0	13	47
Do your homework every night?	60	13	20	7		80	20	0	0
(Your) relatives have high expectations for you?	73	13	13	0		53	47	0	0

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The same positive effects are seen with the students' surveys as was evident with the parents' surveys The students also indicated a greater love of reading and writing following the intervention There was also an increase in many of the other areas Students indicated they were more eager to learn, they had better reading comprehension, and they enjoyed creative activities more than they had earlier The only question with an apparent decrease was in the area of persistence A few more students said that they did not keep working at things if they seemed hard

The researcher in school A completed a weekly observational checklist of the students concerning the following areas higher-order thinking, problem solving, explanation of concepts, ability to stay on task, and evidence of creativity The data compiled from these checklists for weeks 1,4,8,12, and 16 of the intervention are shown in Table 5

Table 5

"Percentage of Second Grade Students in Observed Categories"

Targeted Behaviors	Ratings	Start	Wk 4	Wk 8	Wk 12	Wk 16
Shows Higher-Order Thinking	Not Yet	43	31	25	13	13
	Sometimes	50	56	43	43	38
	Frequently	6	13	31	43	50
Good at Solving Problems	Not Yet	63	25	25	25	25
	Sometimes	38	63	56	31	25
	Frequently	0	13	19	43	50
Can Explain Concepts	Not Yet	50	43	31	13	13
	Sometimes	25	25	38	43	25
	Frequently	25	31	31	43	63
Stays on Task, Finishes Projects	Not Yet	43	6	6	0	0
	Sometimes	25	43	43	43	25
	Frequently	31	50	50	56	75
Shows Creativity	Not Yet	56	43	31	13	13
	Sometimes	38	43	43	56	31
	Frequently	6	13	25	31	56

n = 16

The data gathered from the checklists very clearly show that in every category the percentage in the *not yet* column all decreased and the percentage in the *frequently* column all increased over the period of the intervention. The researcher noted that the only children who did not advance out of the *not yet* column had many other learning difficulties. One child missed 45 days of instruction out of the first three quarters – a full one-third of the school year. The child was also out of the second grade room for a large part of the instructional day. The other child was a Hispanic student who struggled with the English language.

The weekly thinking skills lessons and the daily work on problem solving coupled with cooperative learning played a big part in the growth that was evidenced. When cooperative learning was introduced, students were, at first, reluctant to share with others. They seemed to have been trained already, after only two years of school, to work independently and not help or get help from other students. After a lot of "class" and "team" bonding activities, the students became more comfortable with the idea of working together and enjoyed it. During any given group assignment, it was always interesting for the researcher to walk around and hear students explaining a process or helping to figure out a solution. It also became a form of peer tutoring. Whether they were doing a science experiment, a math problem-solving worksheet, study-buddy reading or creating an art project related to literature, students were all on a equal plane which made them feel good about themselves. Cooperative learning along with thinking skills and problem solving seemed to be very beneficial to increasing student depth of understanding.

The use of alternative assessment was the other factor that influenced the growth evidenced. The researcher analyzed content evaluations (Appendix G), work samples, student portfolios, and student reflections. The researcher noted an improvement in the depth of content understanding as reflections and self-assessment evaluation forms (Appendix H) were analyzed throughout the intervention. During a unit of study on the Life Sciences, students were required to complete a project as set forth in a rubric (Appendix K) and then do an oral presentation about their project. All the students graded themselves with the rubric and then filled out a self-assessment evaluation form. The researcher scored their project and presentation using the same rubric. When student evaluations were compared to teacher evaluations they were, in most cases, almost identical. Most students got top scores because they knew what was expected of them before beginning. In reviewing the self-assessment forms, the researcher concluded that the students had a thorough understanding of the subject. In the same unit of study, cooperative groups were given the assignment of making murals and then doing a group presentation. Again clear guidelines were set forth in a rubric (Appendix K), and because of that, the quality of the work was far better than the teacher had experienced in the past. The group presentations, which had never been required before, were of great benefit to the teacher in evaluating the students' understanding. Following a unit in Social Studies the students were asked to write three things they had learned during that study, rather than take a multiple choice or fill-in-the-blank test. Using the power writing format (Appendix N), the students were able to relate in written form what they had learned, which was a good measure of their depth of understanding.

Work samples collected in the student portfolios showed a marked improvement over the sixteen weeks. As students organized and added to their portfolios, they were able to see for themselves their own growth and development and reflect upon it. Comments in journals and student reflections in their portfolios indicated that the students were showing a greater understanding of their work and also a greater awareness of their improvements. One student said, "I like my portfolio because of the stories and time tests, but I need to improve in time tests." Another said, "Right now I am doing better than last time, and I am getting a little better at math. I am proud of myself and my portfolio." A third child responded, "I have improved in spelling." Still another said, "I need to do my math (flash) cards. I should look over my work." Student-led conferences were conducted at the close of the intervention and students were able to relate to their parents their progress in each of the subject areas; which again was a useful measurement of their understanding.

Students in the second grade classroom did appear to improve their depth of understanding of content. A major factor in accomplishing this increase was the weekly thinking skills lessons, the emphasis on problem-solving strategies, the daily use of cooperative learning, and the implementation of alternative assessments. The increase was evidenced by analysis of student and parent surveys, teacher observational checklists, work samples, content evaluations, portfolios, student reflections, and teacher journal entries.

School B

Results of a pre-intervention student survey presented in Chapter 2 indicated a significant problem with students' ability to persevere and finish tasks that are difficult. In response to the prompt, "I keep working at things even if they seem hard," less than 40% of the students answered "Most of the time." Thus, the researcher implemented alternative assessments that focused on the increased use of problem solving, thinking skills, cooperative learning, and reflection.

One of the projects that students worked on for one week was entitled "The Perfect Classroom." As part of a unit on ratio and proportion, students were required to make a scale drawing of the classroom. In order to do this, they first had to measure the overall dimensions (length and width) and choose an appropriate scale to fit on 18" x 24" posterboard. Once they had outlined the room with the fixed objects on the walls (windows, bulletin board, chalkboard, door, etc.), measurements for all the moveable items had to be made. These included students' desks, two tables, the overhead card, filing cabinet, chairs and so on (Appendix O). However, rather than drawing them immediately, students used their calculations to cut out scale models of each to move around and decide where to put them.

Throughout the first two or three days, students were assigned to work in groups of three. Roles for cooperative learning included someone to measure, record and calculate. Once this was done, if they could not agree on a design or wanted to work alone, students had the option of completing the project together (for the same grade) or on their own. Once the cut-outs were placed how they wanted the room to look, everything had to be traced and labeled. In addition, a one-page paper explaining what each group member did and why the room was designed that way was required. At the end, each group made an oral presentation of their "Perfect Classroom". From this, the researcher picked three from each class and the students voted on the best one. The first place prize was to have the classroom arranged according to their design for a minimum of one week.

Students' reactions and reflections towards this alternative assessment project were almost unanimous. Most of them enjoyed it and worked hard at completing it and doing it well both inside and outside of class. In order to determine whether such attitudes indicated that the intervention was successful, the researcher completed observation checklists for each student every four weeks. The results are presented in Table 6 and analyzed below.

Table 6

"Percentage of Seventh Grade Students in Observed Categories"

Targeted Behaviors	Ratings	Start	Wk 4	Wk 8	Wk 12	Wk 16
Shows Higher-Order Thinking	Not Yet	50	34	27	27	20
	Sometimes	37	43	40	30	23
	Frequently	13	23	33	43	57
Good at Solving Problems	Not Yet	50	37	24	10	7
	Sometimes	33	43	43	37	30
	Frequently	17	20	33	53	63
Can Explain Concepts	Not Yet	27	33	20	20	17
	Sometimes	50	37	50	40	27
	Frequently	23	30	30	40	56
Stays on Task, Finishes Projects	Not Yet	40	30	17	10	7
	Sometimes	37	37	43	30	17
	Frequently	23	33	40	60	76
Shows Creativity	Not Yet	30	30	23	20	13
	Sometimes	53	47	47	33	24
	Frequently	17	33	30	47	63

n = 30

The intervention was apparently successful in the area of student perseverance, where the data show that the percentage of students who were *Not yet* staying on task was reduced from 40% to 7%, while those who *Frequently* stay on task and complete their assignments increased steadily from 23% to 76%. In fact, similar improvements were also noted in students' higher-order thinking, problem solving, conceptual understanding, and creativity. Generally speaking, all of these behaviors went from being observed *Frequently* in less than one-fourth of the students at the start of the intervention to over one-half by the sixteenth week. At the end of the intervention, 20% or less of the students were at the *Not Yet* stage in each of the five categories: showing higher-order thinking, problem solving, explaining concepts, staying on task, and showing creativity. This pattern seems to show that alternative assessment methods have had a positive effect upon students' depth of understanding of content.

However, one particularly troubling trend showed up in the initial survey when students were asked to respond to the statement, " I like math and working with numbers." About 50% of the second graders answered *Most of the time*, as compared to about 40% of junior high students and only about 30% of those in high school. Students in the junior high class were also asked to write a letter in class to the teacher at the beginning of the year entitled "Math and me," in which they voiced their feelings and opinions about their prior math experiences. Their predispositions towards math gives good cause for concern. One student said, "I don't like math most of the time because some things are hard for me to do (Appendix O). Another student explained, "I do not really like math class... because it is my hardest subject in school. I usually get a bad grade in math (Appendix P). Only about 43% of them reported feeling good about learning math, while one-fourth had mixed emotions and the other32% of replies were overwhelmingly negative. While the research was not intended to address this problem, and it is unknown whether or not such attitudes are confined to the subject area of math, perhaps some thought and future research should be devoted to the matter.

Teacher journal entries and reflections kept throughout the period of intervention back up the idea that students learn better when they are enjoying the activities. Not only did time-on-task working together in the classroom increase during alternative assessment projects and performances, but also students were more willing and eager to spend time outside of class on their own (homework). In addition, students more frequently sought assistance from the teacher before or after school during these projects than they did for routine classwork. In short, students found such activities worth their time and effort and thus were more willing to work to complete them. Moreover, the data suggest that the use of alternative assessment (techniques) was responsible for enhancing their understanding and ability to think, solve problems, and explain their ideas.

School C

In order to assess the effects of alternative instructional strategies and assessment on students' depth of understanding of content, many methods of data collection were employed. A teacher observation checklist was completed weekly, a teacher journal was kept, and student reflections and samples of student work were collected. The results from the teacher observation checklist can be found in Table 7.

Table 7

"Percentage of Tenth Grade Students in Observed Categories"

Targeted Behaviors	Ratings	Start	Wk 4	Wk 8	Wk 12	Wk 16
Shows Higher-Order Thinking	Not Yet	70	55	40	35	0
	Sometimes	30	45	40	40	60
	Frequently	0	0	20	25	40
Good at Solving Problems	Not Yet	65	35	10	0	0
	Sometimes	35	65	75	65	40
	Frequently	0	0	15	35	60
Can Explain Concepts	Not Yet	25	5	0	0	0
	Sometimes	75	80	75	65	35
	Frequently	0	15	25	35	65
Stays on Task, Finishes Projects	Not Yet	25	25	30	10	20
	Sometimes	45	35	35	55	35
	Frequently	30	40	35	35	45
Shows Creativity	Not Yet	20	40	20	0	0
	Sometimes	80	60	80	100	80
	Frequently	0	0	0	0	20

n = 20

Observations were charted weekly but Table 7 shows results monthly. According to the results, the intervention appears to have had a generally positive effect on the five targeted behaviors. Higher-order thinking skills, problem-solving skills, and the ability to explain concepts increased dramatically. These three skills were the most relevant to the outcome of increasing students' depth of understanding of content. The last two, staying on task until completion and creativity can vary, expectedly, throughout the school year. Staying on task increased from the beginning of the intervention through week twelve, but decreased at week sixteen. Creativity increased gradually throughout the intervention, but was high before the intervention.

Weekly teacher journal entries were also completed. Analysis of teacher journal entries presented the following results. The researcher found cooperative learning to be helpful in increasing understanding among students. In week seven, the following comment was made: "Students seem to be learning quicker and better in their groups than ever, and sometimes their understanding is better in groups than from just listening to me." As evidenced by other entries, higher-order thinking skills increased and remained at a high level throughout the intervention. The researcher found that cooperative learning and alternative assessment facilitated this increase, as students were asked to explain their reasoning and think about concepts in different ways. The alternative assessments were thought to be thought-provoking and worthwhile activities by the researcher. Finally, the portfolios stood out as being helpful in improving students' metacognitive skills and the reflections contained therein provided a window to the students' thoughts and feelings concerning their learning.

Student reflections were also collected and analyzed by the researcher. At the beginning of the intervention, the researcher began easing alternative assessment into the curriculum using creative art projects. The students were asked to complete projects such as line designs, block lettering, tessellations, isometric drawings, and daisy designs. Some examples of their work appear in Appendix Q. After the unit which employed these projects ended, the students were asked to reflect on these assignments and other reading and discussions. The reflections were positive as to how the students gained a new perspective on how geometry is found in their world in nature and art (Appendix R). Another project done later in the intervention involved cooperative group work and knowledge of area formulas to figure out how many pennies it would take to cover the floor of the classroom. The project was approached as practice in problem-solving skills. At the conclusion of the project, students reflected on the development of their problem-solving skills. By analyzing their problem-solving skills, students better understood and improved the process they used in their mathematical work and therefore better understood the content. Examples of their thoughts can be found in Appendix S. As the year progressed, the researcher found that students became more comfortable with reflections regarding their work. They began to improve in their metacognitive skills because they expected to do a reflection and therefore would think through their actions as they worked. In Appendix T are two examples of student reflection after some assignments dealing with area. The student demonstrates the ability to troubleshoot, transfer, and apply knowledge. These skills were very scarce at the beginning of the intervention.

In addition to student reflections, the researcher used other alternative instructional strategies and assessments in the classroom. For example, when deemed appropriate by the researcher, class investigations were done in the school computer lab with the aid of construction software. Teacher journal entries show that students found using this instructional strategy more applicable to real-life and that it quickened the pace at which they worked. Students no longer needed to worry about doing the constructions correctly and could concentrate on the material to be learned. Examples of some activities used in the computer lab appear in Appendix U. Another alternative assessment used during the intervention was a project involving constructions, which was done in cooperative groups. An example of it can be found in Appendix V. Each group was responsible for completing all of the activities. Then each group was assigned one or two constructions to demonstrate and explain in front of the class. At the end of the week, a group quiz was given on selected constructions presented throughout the week. The researcher found that the students learned a great deal of content involving relationships of angles and sides of figures due to the cooperative atmosphere and the final presentation and group quiz. The students seemed to try harder and were sure they understood all the content in preparation for the presentation and audience questions. Other cooperative projects the students worked on included a jigsaw project (Appendix V) and a unit involving spherical geometry (Appendix V). The researcher found that these projects were beneficial to students and that their depth of understanding of content increased due to their use.

In general, data collected from student reflections show differing viewpoints on classroom activities and teacher expectations during the intervention. Some students expressed distaste for the alternative instructional strategies and assessments and stated that they preferred more traditional means. However, most of these students gave the reason for this stance as sheer comfort with direct instruction followed by practice exercises and traditional assessment. Many of them wrote that this was merely what they were "used to." Other students expressed more positive thoughts on the intervention. They found the new approach refreshing and that it gave them more creative freedom. These students stated that it made their learning more personalized and that they were happy to have the chance to express their thoughts about what they were learning. At the end of the intervention the students were asked to reflect on how five specific instructional strategies and alternative assessments were either beneficial or detrimental to their learning. These five topics included the following: creative and/or artistic projects, cooperative group work, working individually, doing investigations in the computer lab, and being graded on a portfolio. Sample responses can be found in Appendix W. The reflections were positive. Any negative comments were coupled with suggestions for improvement that would be helpful for the researcher in the future, such as the need for more team-building.

Overall, the researcher found that evidence of student understanding showed marked improvement throughout the intervention according to journal entries, student work, and student reflections. The students seemed comfortable with the new approaches and almost always reacted positively in their reflections. The researcher concluded that this intervention was successful based on the aforementioned data sources in addition to results gathered from teacher observation checklists.

School D

One method of data collection used by the researcher in the twelfth grade English classroom was weekly observation checklists of the students in the targeted class. The observation checklists focused on the following five areas: demonstrates higher-order thinking skills, can explain or understand concepts, good at problem solving, stays on task until completion, and shows creativity (Appendix F). All students were rated on a not yet, sometimes, and frequently scale.

In order to analyze students' higher-order thinking skills, the researcher employed the use of questioning in classroom discussion of literature that required students to analyze, compare and contrast, and predict. The data collected consist of researcher observation. The researcher also required students to implement the use of graphic organizers to help foster higher-order thinking. Venn diagrams were used to help students visualize similarities and differences between two characters in preparation for writing a comparison/contrast paper on the play Death of a Salesman. PMIs were used as a form of self-evaluation of a videotaped informational speech performed by all students on the second day of the implementation and also to evaluate the students' feelings on a group bonding exercise that asked students to reveal personal information about themselves to the other members of their group (Appendix Y). Mind maps were also used to record characteristics and methods of characterization used by the authors in the novel The Pearl and the play Death of a Salesman. The data collected to assess the implementation of graphic organizers to promote higher-order thinking were made up of student PMIs, their reflections on their performances, and researcher observations.

The development of problem-solving skills was also a major focus of the implementation. The researcher collected data on problem-solving activities that were incorporated into cooperative learning lessons. One specific lesson used was the "Lost on the Moon" test (Appendix Z). Each base group was put in the hypothetical situation of being lost on the moon. They were given a list of fifteen items that they would need in the event that this happened and they then had to rank the items from least to most important in terms of need for survival. The key to the test was provided by NASA. The data consist of student reflections and observations made by the researcher.

In order to facilitate higher-order thinking and problem-solving skills, cooperative learning opportunities were employed during the implementation. In the twelfth grade English classroom, cooperative learning base groups were established during the first week of school and were maintained during the intervention. The main focus of the base groups in this classroom was vocabulary. The students began a new chapter of vocabulary each week that contained twenty new words and definitions. On Monday, the base groups would write down the words and definitions on paper and then would, as a group, complete a twenty sentence fill-in-the-blank exercise that would require the use of every word in the chapter once during the exercise. On Tuesday, the base groups would complete a twenty-question synonym exercise that required them to read a small list of words, then identify the word from the chapter that was closest in meaning. On Wednesday, base groups would complete an antonym exercise that, similar to the synonym exercise, required groups to read a small list of words, then identify the word from the chapter most opposite in meaning. On Thursday, base groups would complete a choosing the right word exercise. The exercise consisted of twenty sentences that, at some point, provided students with a choice of two vocabulary words from the chapter to correctly complete the meaning of the sentence. Then on Friday, the students would individually take a twenty-five-question test on the chapter they had worked on during the week. The format of the test was consistent throughout the semester, only the words would change from week to week (Appendix AA). The data collected to analyze this cooperative learning activity consisted of student test scores, student reflections, and researcher observations.

Also included in the intervention was the implementation of alternative assessments to evaluate student understanding that also provided opportunities for students' self-assessment. The first form of alternative assessment used in the twelfth grade English classroom was the completion of a portfolio that included fifteen to twenty pieces of student work from the semester that demonstrated growth and development on the students' part. Each piece selected for the portfolio was also accompanied by a reflection from the student that stated the nature of the assignment and the reasons the student had for including the piece in the portfolio. Students were provided with guidelines for the type of work that qualified for entrance into the portfolio by the researcher on the first day of the intervention (Appendix BB). Data collected for portfolio construction include the researcher's observations.

The second form of alternative assessments used were authentic assessment projects that were required by all students upon completion of the three major works of literature during the semester. Those works were The Pearl, Death of a Salesman, and All Quiet on the Western Front. On the first day of the intervention, students were provided with a list of project choices and the rubric to be used in grading the project by the researcher (Appendix CC). Approximately one week after completing each work of literature, all students presented their project to the entire class. Data collected for the authentic assessment projects include student scores, student reflections, and researcher observations.

In addition, five essays with a minimum of five paragraphs were produced as a form of alternative assessment. Students wrote a paper on John Steinbeck's use of symbolism in the novel, a paper comparing and contrasting two characters from the play Death of a Salesman, a narrative paper, a persuasive paper, and a descriptive paper. A research project was also completed that required students to produce a three to five page paper focusing on a career that they were interested in pursuing. The three to five page limit did not include the required title page, outline, and works cited page Data collected for the essays include student reflections and researcher observations

The final form of alternative assessment used was the writing of three journal entries per week Students would write for ten solid minutes, three times a week into a journal either on a topic provided by the researcher or on a topic of interest to the student at the time of the entry Students were encouraged to write continuously for the ten minute period about whatever was on their mind in regard to the topic The journal entries were continued through the first six weeks of school and then were stopped The purpose of the journal entries was to provide students with the opportunity to get back in the flow of writing after having the summer off and also to give them a chance to write their true feelings on a subject in an ungraded, personal diary type of environment The data collected for the journal entries consists of researcher observation

Table 8

"Percentage of Twelfth Grade Students in Observed categories"

Targeted Behaviors	Ratings	Start	Wk 4	Wk 8	Wk 12	Wk 16
Shows Higher-Order Thinking	Not Yet	4	4	0	0	0
	Sometimes	87	70	52	30	22
	Frequently	9	26	48	70	78
Good at Solving Problems	Not Yet	0	0	0	0	0
	Sometimes	100	61	35	26	9
	Frequently	0	39	65	74	91
Can Explain Concepts	Not Yet	4	5	0	0	0
	Sometimes	66	43	35	17	13
	Frequently	30	52	65	83	87
Stays on Task, Finishes Projects	Not Yet	0	0	0	0	0
	Sometimes	0	39	39	22	13
	Frequently	100	61	61	78	87
Shows Creativity	Not Yet	0	0	0	0	0
	Sometimes	96	52	48	43	26
	Frequently	4	48	52	57	74

n = 23

Analysis of the weekly observation checklists mentioned in the presentation of the data suggest that the intervention had a positive effect on the five targeted behaviors. The percentage of students identified as frequently demonstrating higher-order thinking skills, problem-solving skills, the ability to explain concepts, and creativity steadily increased throughout the intervention. Every student showed the ability to stay on task until completion of a project at the beginning of the intervention. That percentage dropped off markedly in the middle of the intervention but then rose again toward the end.

In analyzing the data collected to assess students' higher-order thinking skills, the class as a whole made steady improvement over the course of the intervention. There were two factors that attributed to this improvement. One, given the make-up of the students in this class, a general level senior English class, the students in all likelihood spent very little time, if any, engaged in any reading of significant literature. Therefore, beginning the school year with the immediate study of a novel took most students a period of time to get back into the type of thinking necessary to handle literature. Secondly, a shift in scheduling of the school day from a traditional forty-eight minute period, eight period day to a ninety-three minute block, four block day enabled students to spend more time in the in-depth study of literature that allowed them the necessary time to build upon their higher-order thinking skills and improve on them over the course of the semester. The researcher noted this improvement through classroom discussion and the answers that students recorded in study guides that accompanied all three works of literature covered.

The use of graphic organizers was also instrumental in fostering the improvement of higher-order thinking skills. The Venn diagram was a great aid in allowing the students to visually record the similarities and differences between two characters selected to compare and contrast from the play Death of a Salesman. The paper required students to select three main differences between two characters for discussion in the body of the paper, and students also needed to have similarities between the two characters to use in the introduction of the paper to make the transition to the differences. The clarity with which the students wrote the papers and the quality of evidence they used to support was an indication of the effectiveness of the Venn diagram. This was the first time the researcher made the Venn diagram a requirement.

The use of the PMI as a form of self-evaluation was also beneficial to improving student higher-order thinking. The students first used the PMI to evaluate themselves on a videotaped informational speech the second day of school. Students completed the PMI in regard to what the class had decided were necessities of being an effective public speaker the previous day in a classroom discussion. The PMIs indicated that the students were very perceptive of their own strengths and weaknesses as a public speaker. In many cases, their self-evaluation was much more critical than what the researcher's would have been. The PMIs were also helpful to students when they performed speeches later in the year, especially the speech that was connected to the research paper project. Student A stated, "From evaluating my own speech, I could pin point my own strengths and weaknesses. I learned that I had some really strong qualities in giving a speech. On the other hand, I also learned that I needed to make some minor repairs" (Appendix EE). Student B stated, "It shows my improvement by the way I have gotten better presenting myself. In one of my first speeches I received a C, then after awhile my next speech was a B" (Appendix EE). The PMI was also beneficial in helping students identify the value in a group bonding exercise done the second week of school. The exercise required the students to share personal, sometimes private, information about themselves to the other members of their group with the goal being to learn more about each other, consequently working better together. Student A stated, "It helped me talk more about my feelings, and tell more about myself. I think that I needed work in this area, and this shows my improvement toward working on this problem. Another reason was it helps me think what would really affect me. What will really embarrass me, and it helps me think about growing up" (Appendix FF). Student B stated, "Most assignments are about books you read or pronouns, but this was about your life and it got you to express your own feelings on certain topics, and I like doing different things instead of the same old boring work" (Appendix FF). The use of mind maps was very helpful in enabling students to understand how an author uses methods of characterization to make a reader feel a certain way about a character. The mind map was used with a character's name written in a circle on the blackboard. Then, facts about that character were extended in circles from the character's name. Evidence to support those facts was then branched off into a third level of circles. After completing a mind map for the characters in The Pearl, the first novel studied, the researcher observed much improvement in handling characterization for characters in Death of a Salesman and All Quiet on the Western Front.

Data collected to assess problem-solving skills also suggest that the students in the twelfth grade English classroom made steady improvement over the course of the intervention. One assignment incorporated into the cooperative learning groups was the "Lost on the Moon" test. During the exercise, the researcher observed serious discussion on all items by all groups, even though they had very little prior knowledge to work from. Their effort and discussion, not their final scores, was what the researcher found rewarding. Student A noted, "For this project, we worked together and got the best score in the class" (Appendix GG). In addition to this exercise, the researcher also noted improvement over the course of the semester of each base group in terms of figuring out ways for each member to perform a part in completing group assignments.

As stated in the presentation of the data, the main use of cooperative learning in the twelfth grade English classroom was for handling vocabulary. The researcher has taught the same vocabulary to this grade level for the last eight years, and it has never been as successful as it was during this intervention. Vocabulary test scores in the past have been the biggest downfall of students in this particular section of English. The major reason for the improvement again can be attributed to the change to block scheduling. The ninety-three minute block made working with the vocabulary chapter everyday a reality. In the old forty-eight minute period, eight period day, the researcher would correct the entire unit with students on Thursday and the students would take a test on Friday, and it was not uncommon for students to copy the unit from another student prior to entering class on Thursday or not complete the unit at all. During this intervention, students worked on the unit together Monday through Thursday and would then take a test on Friday. Being in contact with the words on a daily basis and working together were the two main causes for improvement. In analyzing the average vocabulary test scores of the class as a whole, there were only two tests out of fifteen taken where the class average was less than eighty percent, and there were two weeks where the class average was over ninety percent. Class averages on vocabulary tests have never been this high in the researcher's experience. Student A stated, "Last year I did not complete more than two or three chapters of vocab and as a result, I never did better than fifteen on any of my quizzes. This year, we did vocab in class, so I almost always got good grades on the quizzes" (Appendix HH). Student B stated, "I chose these (vocabulary tests) because they are all better scores than I have received in the past. I have done very well in vocab this year. I am very proud of myself and have learned many new words that have come into my vocabulary" (Appendix HH). Student C stated, "This is an area of major improvement for me. We didn't really do any vocabulary last year, or at least I didn't learn any. So going from a five out of twenty-five, to twenty-four out of twenty-five is a huge improvement, and I actually remember more of the words now. I think doing a little bit each day helps a lot" (Appendix HH).

In addition, data collected by the researcher to analyze the value of implementing alternative assessments to evaluate student understanding suggest that they were extremely successful. The first form of alternative assessment, the portfolio, was very helpful in holding students accountable for their own growth and development as a student in the twelfth grade English classroom. The researcher believes that the students treated the portfolio in a serious manner, considering it was an ungraded requirement of the class. The students were honest in considering pieces that they included to show the growth and development. Not all students were able to identify fifteen to twenty pieces that were evidence of growth and development but were candid in their explanation. Student A stated, "I do not have enough assignments to complete my portfolio. We were expected to include fifteen pieces of our work that showed growth and development. I believe that only nine of mine actually show any development through the year. The rest are terrible pieces of work I did not even want to try to make look like improvement. So, therefore, I only have nine pieces of my work, instead of the required fifteen pieces we were told to include" (Appendix II).

The data collected to analyze the second form of alternative assessment, the authentic assessment projects for literature study, indicate that this was the most valuable piece of the intervention for the goal of improving the depth of student understanding of content. All projects from the list provided to students required them to go much more in-depth to successfully complete a project than to prepare for a standardized test on the same piece of literature. The criteria of "Covers the entire novel" on the grading rubric was most responsible for achieving this outcome. The average scores on the projects for the novel The Pearl were eighty-seven percent. The average scores on the projects for the play Death of a Salesman were eighty-one percent, and the average scores on the projects for the novel All Quiet on the Western Front were eighty-seven percent. Considering that this is the first class the researcher has ever required this type of project form, it is his opinion that the three sets of projects were well done and certainly valuable in implementing. The researcher noted a quality of work and a pride in that work that has not been commonly associated with students of the same level course in the past eight years. It was very rewarding to see the creativity and enthusiastic presentation of these projects over the course of the implementation. Student A stated, "This is the project I did on Death of a Salesman. I received a ninety-four out of one hundred on this which is an A. I worked hard on this project. I made an A-Z book of the novel. I chose this because it is a strong grade and I worked hard on it. I did very well at understanding the topic and covering the entire novel. I am very proud of this project" (Appendix JJ). Student B stated, "The first piece I'm putting in my portfolio is the project on The Pearl, by John Steinbeck. What I did is I made a map of what I thought the island that the story took place on would look like. I also labeled landmarks that were important to the plot. The reason I'm putting this in my folder is because I did very well on it, and because it's always been hard for me to present things in front of people, and I did a good job of presenting this project" (Appendix JJ). Student C stated, "The next piece is the project for The Pearl and the project I did on Death of a Salesman in which I did very good. On The Pearl, I got one hundred out one hundred and on Death of a Salesman I got an eight5y-six out of one hundred. The project consisted of making a golf course that dealt with problems relating to the book to each hole of the nine hole course. The other project consisted of me making newspaper articles on topics relating to the book. The reason I chose these pieces for my portfolio was because I did a really good job on them and I spent a lot of time working on them" (Appendix JJ).

The data collected to analyze the final form of alternative assessment, writing five essays with a minimum of five paragraphs and a research paper, indicate that the students made continual improvement in becoming more effective writers and communicators. This course level has traditionally struggled with writing skills. Again, the block schedule provide more time for the researcher to develop stronger sentence writing skills, better organizational skills, and create a pace of production that was more user friendly. The ample time to work lessened student anxiety about writing and provided them with more opportunities to think things through before actually writing. Student A stated, "These are three of my papers that I wrote. My bedroom paper, which is a descriptive paper, my symbolism in The Pearl paper, and my narrative paper, Getting Out of Going to Aunt Cathy's. All of these show improvement to me, as I have never gotten very good grades on papers. On all three of these I got As. I think that shows a lot of improvement" (Appendix KK). Student B stated, "After we read The Pearl, we had to write about some kind of symbolism that was in the story. I chose to write on how the pearl showed symbolism in many different ways. In doing this paper, I learned how to pick out an object and show how it symbolizes something. I had never really known how to do that before. Even though I did not get a perfect grade, I still learned how to show symbolism in a story" (Appendix KK). Student C stated, "The next thing I'm going to put into my portfolio are some papers I wrote. One of them was Death of a Salesman and the other was My Favorite Room. The reason I'm putting this into my portfolio is because I have never been a good writer and I have become a better writer towards the end of the year" (Appendix KK).

The research project was valuable not only because it taught students how to organize and communicate a great deal of information, but also because the students researched a career that they were interested in pursuing. Over the past seven years, this course has traditionally researched a topic related to the environment. The researcher made the decision to switch to an occupational interest to make the project more authentic. As a result of classroom discussion following the completion of the project, the researcher noted that the students learned a great deal about the career they selected and consequently had a better handle on what to expect in pursuit of that occupation. Several students, after completing the project, even decided that they were no longer interested in that career.

The data collected on the final form of alternative assessment, journal writing, also indicated that its implementation was worthwhile. The journal writing provided the students with a stress-free opportunity to write about their true feelings about a subject. The researcher assured students prior to writing the first entry that he would never collect and read what they had written. It was this guarantee that allowed them to write freely, consequently getting them back into the habit of writing and explaining their thoughts and feelings which prepared them for the writing that they would perform later in the semester that would be graded. This style of writing helped the students develop a positive attitude about writing at the beginning of the semester that helped them through all of the writing they completed during the intervention.

Conclusions and Recommendations

Based on the presentation and analysis of the data collected throughout the intervention, the use of a variety of instructional strategies and alternative assessments appears to increase the depth of student understanding. The use of cooperative learning and the development of problem-solving strategies and higher-order thinking skills all played a direct and pivotal part in this increase as well. As a result of incorporating cooperative learning into the four targeted classrooms, students were able to bond with their classmates, which created a comfortable learning environment. Within this environment, ideas could be exchanged freely and concepts were learned in a variety of ways. The focus on problem-solving strategies increased the students' ability to think logically, to organize data, and to find solutions to various issues. Students' experiences with these strategies will better prepare them to confront and conquer the problems that they will face in the real world. Like problem-solving strategies, higher-order thinking skills help students go beyond the basics to a deeper understanding of content through skills like analysis, synthesis, evaluation, inductive reasoning, and prediction. The use of these instructional strategies was invaluable to the success of this action research project. An equally valuable facet of the intervention was the implementation of alternative assessment. These forms of assessment not only provided the researchers with a variety of instruments to evaluate the depth of student understanding, but also provided a creative outlet for students to demonstrate their understanding of a specific topic. Students also developed a greater sense of ownership of the work they produced. The opportunities for reflection that were provided to students enabled them to give feedback to their teachers, chart their progress, and develop their metacognitive skills. This implementation, as evidenced by the data collected, without question, improved the depth of students' understanding of content.

With the goal of improving students' depth of understanding of content in mind, the researchers strongly recommend implementing any or all of the various instructional strategies and alternative assessments that were outlined in the plan. The only drawback to this change in instructional strategy is the amount of time required in planning activities and evaluating student work. However, these researchers have found that the end result is worth the effort expended.

The four researchers involved in this study will continue the use of these instructional strategies within their own classrooms in future years and would certainly recommend it to other teachers. Whatever the grade level or subject matter, the use of alternative assessments integrated with student self-assessment and reflection can and will increase students' depth of understanding in the content areas.

References

Adelman, N., & Pringle, B.(1995). Education reform and the uses of time. Phi Delta Kappan, 77 (1), 27-29.

Baker, E.L. (1994, March). Making performance assessment work: The road ahead. Educational Leadership, 58-62.

Baron, M.A. & Boschee, F. (1996, April). Dispelling the myths surrounding obe. Phi Delta Kappan, 1-5.

Bellanca, J. (1992). How to grade (if you must). In A. Costa, J. Bellanca, R. Fogarty (Eds.). If Minds Matter: Volume II (pp. 297-311). Palatine, Illinois: IRI/ Skylight Publishing Inc.

Brandt, R. (1994). On making sense: A conversation with Magdalene Lampert. Educational Leadership, 51 (5), 26-30.

Burke, K. (1994). The mindful school: How to assess authentic learning. Arlington Heights, IL: IRI/Skylight.

Characteristics of worthwhile performance tasks, (1995). [on-line].

Checkley, K. (1997). Assessment that serves instruction. Association for Supervision and Curriculum Development, 39 (4), 1, 4-6.

Cizek, G.J. (1995). The big picture in assessment and who ought to have it. Phi Delta Kappan, 77 (3), 246-252.

Costa, A., & Kallick, B. (1992). Reassessing assessment. In A. Costa, J. Bellanca, R. Fogarty (Eds.). If Minds Matter: Volume II (pp. 275-280). Palatine, Illinois: IRI/ Skylight Publishing Inc.

Dietel, R.J., Herman, J.L., & Knuth, R.A. (1991). What does research say about assessment?. NCREL, Oak Brook.

Ellsworth, P., & Sindt, V. (1994). Helping "aha" to happen: The contributions of Irving Sigel. Educational Leadership, 51 (5), 40-44.

Fogarty, R. (1992). The most significant outcome. In A. Costa, J. Bellanca, R. Fogarty (Eds.). If Minds Matter: Volume II (pp. 349-353). Palatine, Illinois: IRI/ Skylight Publishing Inc.

Gardner, E. (1989). Five common misuses of tests [on-line]. ERIC Digest (108). American Institutes for Research Washington D.C., Reprinted from: Ability testing: uses, consequences, and controversies (1982). National Academy Press, Washington, D.C. Abstract from: ED315429 TMO 14444.

Gardner, H., & Boix-Mansilla, V. (1994). Teaching understanding--within and across the disciplines. Educational Leadership, 51 (5), 14-18.

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Growth Dimensions (1996). Boone County Demographics. Belvidere, Il.

Guskey, T.R. (1994, March). What you assess may not be what you get. Educational Leadership, 51-54.

Harris, P. (1992). Restructuring for learning. In Costa, A., Bellanca, J. & Fogarty, R. (Eds.). If Minds Matter: A Foreword to the Future. Volume I: A Rationale for Change (pp. 3-11). Palatine, Illinois: IRI/Skylight Publishing Inc.

Herman, J.L., Aschbacher, P.R., & Winters, L. (1992). A practical guide to alternative assessment. Alexandria, VA: ASCD.

Hill, B.C., & Ruptic, C. (1994). Practical Aspects of Authentic Assessment: Putting the Pieces Together. Norwood, MA: Christopher-Gordon Publishers, Inc.

Imel, S. (1993). Portfolio assessment in adult, career, and vocational education trends and issues alerts.. ERIC Clearinghouse.

The Institute for the Learning Sciences. (1994). Multiple-choice tests. [on-line].

Jamentz, K. (1994, March). Making sure that assessment improves performance. Educational Leadership, 55-57.

Jeroski, S. (1992). Finding out what we need to know. In A. Costa, J. Bellanca, R. Fogarty (Eds.). If Minds Matter: Volume II (pp. 281-295). Palatine, Illinois: IRI/ Skylight Publishing Inc.

Juarez, T. (1996). Why any grades at all, father? Phi Delta Kappan, 77 (5), 374-378.

Kallick, B. (1992). Evaluation: A collaborative process. In A. Costa, J. Bellanca, R. Fogarty (Eds.). If Minds Matter: Volume II (pp. 313-319). Palatine, Illinois: IRI/ Skylight Publishing Inc.

Kane, M.B. & Khattri, N.(1995). Assessment reform. Phi Delta Kappan, 77 (1), 30-32.

Marzano, R.J. (1994, March). Lessons from the field about outcome-based performance assessments. Educational Leadership, 44-49.

Match assessments to instructional content and student performance goals (1997) [on-line]. Pathways Home Page.

McTighe, J. (1996-1997). What happens between assessments?. Educational Leadership, 54, 6-12.

Miles, T. (1991). Criteria for complex performance-based assessments. ERIC Document).

Pallrand, G. J. (1996). The relationship of assessment to knowledge development in science education. Phi Delta Kappan, 315-318.

Perkins, D. (1994, January). Do students understand understanding? Education Digest, 1-6.

Perkins, D., & Blythe, T. (1994). Putting understanding up front. Educational Leadership, 51 (5), 4-7.

Perrone, V. (1994). How to engage students in learning. Educational Leadership, 51 (5), 11-13.

Phillips, D.R., Phillips, D.G., Melton, G., & Moore, P. (1994). Deans, blocks, and buttons: Developing thinking. Educational Leadership, 51 (5), 50-53.

Rudner, L.(1997). A long overview on alternative assessment. ERIC/AE and Carol Boston, ACCESS ERIC.

School Report Card (1996a). Lincoln Elementary School. Belvidere Community Unit School District #100. Belvidere, IL.

School Report Card (1996b). Belvidere Junior High School. Belvidere Community Unit School District #100. Belvidere, IL.

School Report Card (1996c). Belvidere High School. Belvidere Community Unit School District #100. Belvidere, IL.

School Report Card (1996d). Hampshire High School. Hampshire Community Unit School District #300. Hampshire, IL.

Simmons, R. (1994). The horse before the cart: Assessing for understanding. Educational Leadership, 51 (5), 22-23.

Sperling, D. (1994). Assessment and reporting: A natural pair. Educational Leadership, 52 (2), 10-13.

Stiggins, R.J. (1995). Assessment literacy for the 21st century. Phi Delta Kappan, 77 (3), 238-245.

Stix, A. (1997). Empowering students through negotiable contracting. [on-line].

Unger, C. (1994). What teaching for understanding looks like. Educational Leadership, 51 (5), 8-10.

Waters, T., Burger, D., & Burger, S. (1995). Moving up before moving on. Educational Leadership, 52 (6), 35-40.

Wiggins, G. (1990). The case for authentic assessment (Report No. TM016142). Washington, D.C.: American Institutes for Research. (ERIC Document Reproduction Service No. ED328611).

Wiske, M.S. (1994). How teaching for understanding changes the rules in the classroom. Educational Leadership, 51 (5), 19-21.

Worthen, B.R. (1993). Critical issues that will determine the future of alternative assessment. Phi Delta Kappan, 444-456.

Appendix A
Parent Permission Letter

August 26, 1997

Dear Parents:

Your child's teacher, is currently a student of St. Xavier University involved in their Master's Program. She is conducting a research project designed to improve students' depth of understanding of content through the use of alternative means of assessment such as projects, performances, and exhibitions.

The attached "Parent Survey" will be helpful to her in gathering pre-intervention data. Your child will also be asked to complete a "Student Survey" in class. Please be assured that the information you and your child provide will remain completely anonymous and will not affect the child's grade in any way.

Your child's participation in this project will not affect the normal flow of the school year. They will be doing some exciting and interesting projects that hopefully will improve their depth of understanding in many of the content areas. Should you have any questions about your child's participation in this program, please feel free to call or visit the school. It would be appreciated if you would sign the consent form below and have your child return it, along with your survey, as soon as possible.

I, the Parent/Legal Guardian of the minor named below, acknowledge that the project's purposes have been explained to me, and any questions I have about the program and my child's participation can be addressed by contacting the school. I voluntarily consent to my child's participation, and I understand that any information collected during the program will be completely anonymous.

____
Name of Minor Participant

____________________________ ____________
Signature of Parent/Legal Guardian Date

Parent Survey

Child's Name: ______________________________ Date: __________

Please take a few minutes to reflect upon the study habits of your child. Using the codes below, circle the numbers that best indicate your observations. Then complete the statements that follow and return this form to school.

1 = Most of the time
2 = Sometimes
3 = Rarely
4 = Never

My child:

Can stay on task until completion.	1	2	3	4
Seems to want to learn/curious about things.	1	2	3	4
Makes free time choices independently.	1	2	3	4
Likes to read.	1	2	3	4
Understands what he/she reads.	1	2	3	4
Likes to write.	1	2	3	4
Is creative in many areas.	1	2	3	4
Is good with numbers.	1	2	3	4
Is good at problem solving.	1	2	3	4
Is easily influenced by his/her peers.	1	2	3	4
Does homework every night.	1	2	3	4

My child seems to have a ______________ attention span.
long, average, short

Strengths that I see in my child are: ______________________________
____

Some of my child's interests are: ______________________________
____

Some areas where my child needs to improve are: ______________________________
____

My child spends approximately __________ minutes on homework each night.

Please use the back of this form to write any concerns or questions you may have.
Thank you for your help!

Parent Survey

Child's Name: ______________________________ Date: __________

Please take a few minutes to reflect upon the study habits of your child. Using the codes below, circle the numbers that best indicate your observations. Then complete the statements that follow and return this form to school.

1 = Most of the time
2 = Sometimes
3 = Rarely
4 = Never

My child:

Can stay on task until completion.	1	2	3	4
Seems to want to learn/curious about things.	1	2	3	4
Makes free time choices independently.	1	2	3	4
Likes to read.	1	2	3	4
Understands what he/she reads.	1	2	3	4
Likes to write.	1	2	3	4
Is creative in many areas.	1	2	3	4
Is good with numbers.	1	2	3	4
Is good at problem solving.	1	2	3	4
Is easily influenced by his/her peers.	1	2	3	4
Does homework every night.	1	2	3	4

My child seems to have a ____________________ attention span.
long, average, short

Strengths that I see in my child are: ______________________________

____

Some of my child's interests are: ______________________________

____

Some areas where my child has improved are: ______________________________

____

My child spends approximately __________ minutes on homework each night.

Please use the back of this form to write any concerns or questions you may have.
Thank you for your help!

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Student Survey

Name: ______________________________ Date: __________

Please take a few minutes to reflect upon your study habits. Using the codes below, circle the numbers that best indicate your feelings. Then complete the statements that follow and return this form to your teacher.

1 = Most of the time
2 = Sometimes
3 = Rarely
4 = Never

I like to find out about things on my own.	1	2	3	4
I like to learn and am curious about things.	1	2	3	4
I like to read.	1	2	3	4
I understand what I read.	1	2	3	4
I like to write.	1	2	3	4
I enjoy creative activities.	1	2	3	4
I like math and working with numbers.	1	2	3	4
I keep working at things even if they seem hard.	1	2	3	4
My friends influence how I work in class.	1	2	3	4
I do homework every night.	1	2	3	4
My friends & relatives have high expectations for me	1	2	3	4

I especially like to learn about: ______________________________

I am really good at: __________ ______________________________
____

One thing I find difficult is: ______________________________
____

I would like to know more about: ______________________________
____

I spend approximately __________ minutes on homework each night.

Please use the back of this form to write any concerns or questions you may have.
Thank you for your help!

Appendix E

Student Survey

Name: ____ Date: __________

Please take a few minutes to reflect upon your study habits. Using the codes below, circle the numbers that best indicate your feelings. Then complete the statements that follow and return this form to your teacher.

1 = Most of the time
2 = Sometimes
3 = Rarely
4 = Never

I like to find out about things on my own.	1	2	3	4
I like to learn and am curious about things.	1	2	3	4
I like to read.	1	2	3	4
I understand what I read.	1	2	3	4
I like to write.	1	2	3	4
I enjoy creative activities.	1	2	3	4
I like math and working with numbers.	1	2	3	4
I keep working at things even if they seem hard.	1	2	3	4
My friends influence how I work in class.	1	2	3	4
I do homework every night.	1	2	3	4
My friends & relatives have high expectations for me.	1	2	3	4

I especially like to learn about: ____________________________________

I am really good at: __________ ______________________________
____

One thing I find difficult is: ________________________________
____

One thing I am better at now is: ______________________________
____

I spend approximately __________ minutes on homework each night.

Please use the back of this form to write any concerns or questions you may have.
Thank you for your help!

OBSERVATION CHECKLIST

Teacher: ______________________ Class: ______________________ Date: ____________

Target Skills: ____

Ratings:
✚ = Frequently
✓ = Sometimes
○ = Not Yet

NAMES OF STUDENTS	Demonstrates Higher-Order Thinking	Good at Solving Problems	Can Explain Concepts	Stays on Task Finishes Projects	Shows Creativity	COMMENTS
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						
17.						
18.						
19.						

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Problem Solving EVALUATION

Name:____ Date_______________

1. Tell briefly how you approached the problem. What were the strategies and/or techniques that you used to get started?

2. What different ways did you organize all of you materials/information?

3. How did you solve the problem? What techniques made you feel successful?

4. How do you feel about the way the process worked for you? What are some things that might have made it easier for you? What were some strategies other students used that made sense to you?

Reading EVALUATION

Name:________________________________ Date______________

1. Explain the main idea of the passage.

2. List two supporting details of the passage.

3. Draw two inferences about the main character.

4. Critique the passage. How did you feel about it? What did you like/dislike?

Project Check-up

Name:________________________________ Date______________

1. My project / assignment is.

____

____

____

____

2. I accomplished.

____

____

____

3. I learned: (list at least two things).

____

____

____

____

4. I feel good about:

____

____

5. I need help with:

____

____

6. Now I understand:

____

____

____

EVALUATION

Name:________________________________Date______________

1. Tell briefly how you approached the problem. What were the strategies and/or techniques that you used to get started?

2. What different ways did you organize all of you materials/information?

3. How did you solve the problem? What techniques made you feel successful?

4. How do you feel about the way the process worked for you? What are some things that might have made it easier for you? What were some strategies other students used that made sense to you?

Self-Assessment Checklist

Name ______________________ **Date** __________

Unit Project ______________________

1. What did you do in this project?

2. What did you do well?

3. What parts of the project could you do better next time?

4. What did you learn from this project?

5. What did you like best about this project?

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Appendix H (continued)

Peer Assessment Checklist

Name ______________________ **Date** __________

Project or Activity ______________________

1. What did your classmate do in this project?

2. What was the best thing your classmate did?

3. How would you rate your classmate's work? (Circle one)

Excellent   Good   Fair   Needs Improvement

4. What suggestions would you make to help your classmate do better next time?

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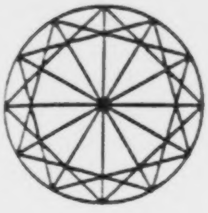
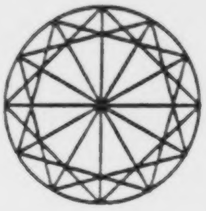
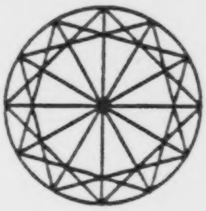
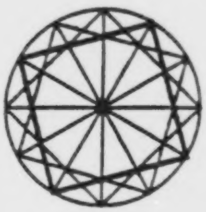
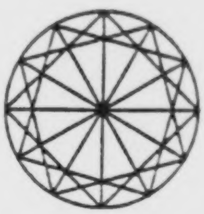
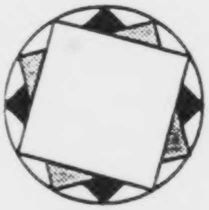
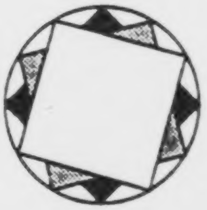
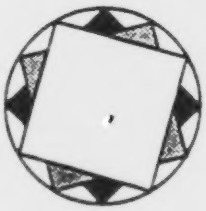
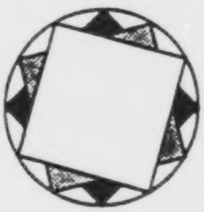
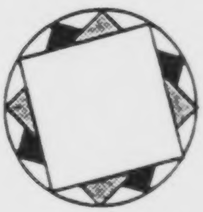
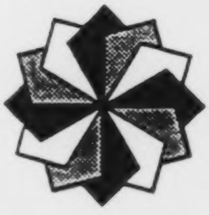
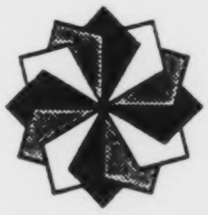
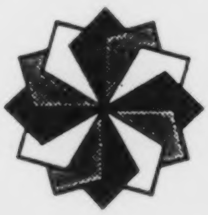
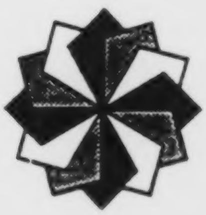
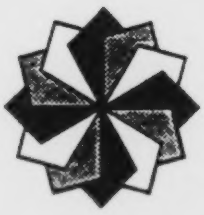
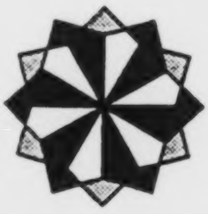
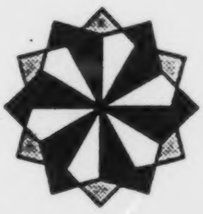
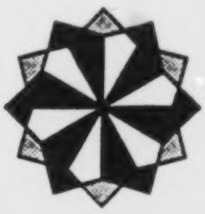
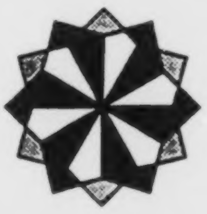
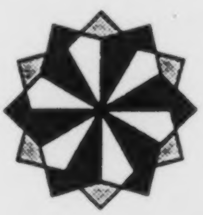
DIFFERENT DESIGNS

Draw a ring around the circle design in each row that is different.

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This page includes many different kinds of analogies. Look carefully at the relationship between the first two words. Find the word that is related to the third word in the same way the first two words are related. Write that word on the line.

Example
dog is to bark as bell is to chime

1. big is to little as last is to ____________
first face back

2. first is to second as third is to ____________
fourth three next

3. Lisa is to girl as maple is to ____________
map tree birch

4. finger is to hand as wheel is to ____________
skateboard roll round

5. white is to milk as red is to ____________
pink color tomato

6. add is to subtract as up is to ____________
high down upper

7. ring is to finger as hat is to ____________
bat baseball head

8. child is to children as school is to ____________
schools books classes

9. sweet is to sour as crooked is to ____________
curved road straight

10. tennis is to game as lark is to ____________
bird lovely robin

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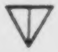
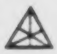
Look at the first two figures. Decide how they are related. Find the figure that is related to the third figure in the same way that the first two figures are related. Draw a circle around the figure that completes the analogy.

Example: *addition* is like + as *equal* is like =

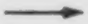
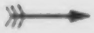
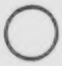
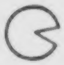
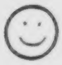
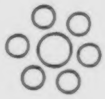
1. L is like ⅂ as B is like a. b. ᗺ c. **B**

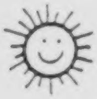
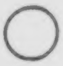
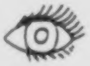
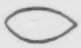
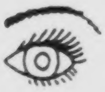
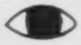
2. 1 2 3 is like 4 5 6 as 4 5 6 is like a. 1 2 3 b. 6 5 4 c. 7 8 9

3. + is like – as A is like a. Λ b. ∀ c. V

4. ▭ is like ⊠ as △ is like a.  b.  c.

5. H is like GHI as M is like a. AMX b. MNO c. LMN

6.  is like  as  is like a.  b.  c. 

7.  is like  as  is like a.  b.  c. 

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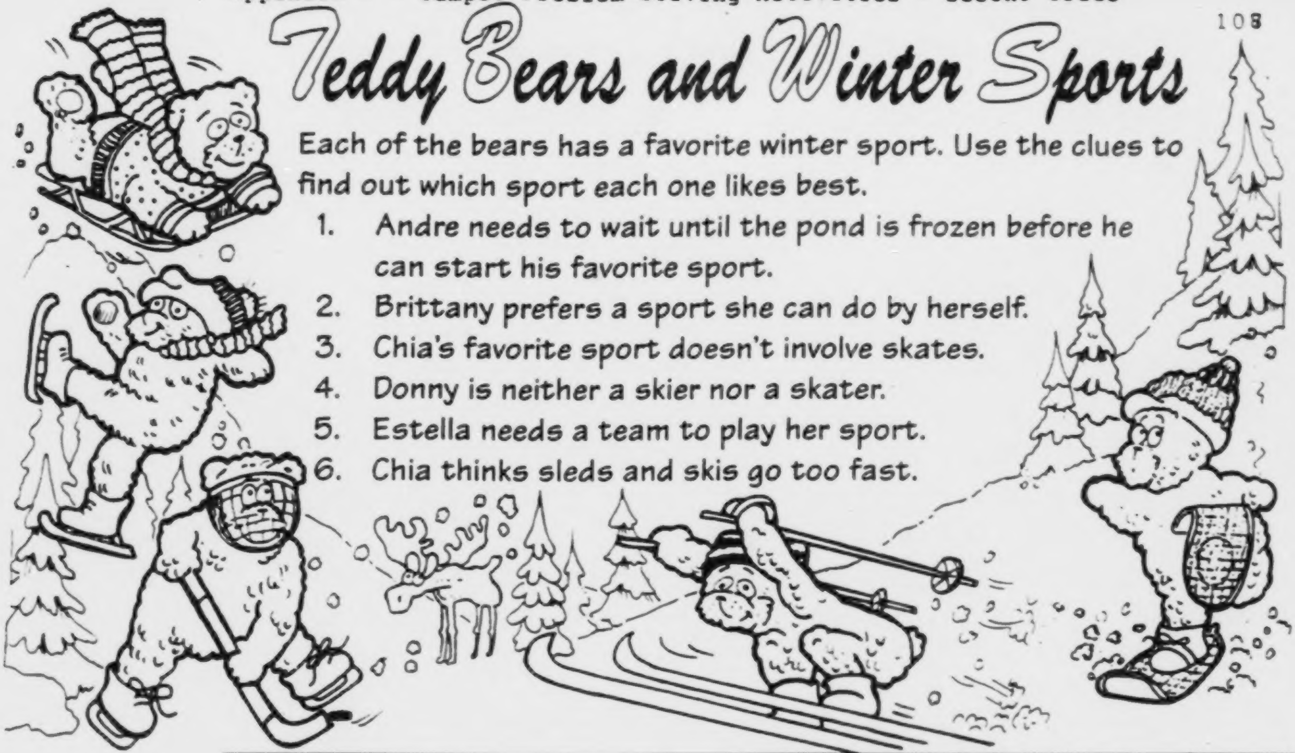
Teddy Bears and Winter Sports



Each of the bears has a favorite winter sport. Use the clues to find out which sport each one likes best.

1. Andre needs to wait until the pond is frozen before he can start his favorite sport.
2. Brittany prefers a sport she can do by herself.
3. Chia's favorite sport doesn't involve skates.
4. Donny is neither a skier nor a skater.
5. Estella needs a team to play her sport.
6. Chia thinks sleds and skis go too fast.

	Andre	Brittany	Chia	Donny	Estella
Ice skating					
Skiing					
Snow shoeing					
Ice Hockey					
Sledding					

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Bear Resolutions

Tina, Tomás, Tanya, Tayisha, and Teddy wanted to start the new year off right, so they each made a different resolution. The resolutions were:

- I won't fight with my sister any more.
- I'll start keeping my room clean.
- I'll make my bed every day before I go to school.
- I'll take out the trash without being asked.
- I'll help with the dishes every night after dinner.

Can you figure out which bear made which resolution?

Clues:

1. It didn't take one bear long to decide that he needed to stop fighting with his sister!
2. Tayisha already kept her room clean and her bed made, so she decided upon another resolution.
3. One of the boys resolved to surprise his mother by taking out the trash every night.
4. Teddy and Tanya don't have sisters. Tayisha has three brothers.
5. Tina's big sister makes both their beds every morning, so Tina made a different resolution.

	Tina	Tomás	Tanya	Tayisha	Teddy
Stop fighting with my sister					
Keep my room clean					
Make my bed every day					
Take out the trash					
Help with the dishes					

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Appendix K
Sample Rubrics - Second Grade

Group Murals

Assignment: Creat a mural depicting a scene from Dinosaur times. Choose from Triassic, Jurassic, or Cretaceous periods. Work in a cooperative group.

Evaluation: Group ____ Teacher ____

SCORING OF PROJECT

Criteria: Neatness of Coloring
Oops! Almost Dinomite!
1------------------------2------------------------3------------------------4------------------------5
Sloppy O.K. Very Neat

Criteria: Neatness of drawings
Oops! Almost Dinomite!
1------------------------2------------------------3------------------------4------------------------5
unrecognizable Know what most things are Great Details

Criteria: Use of Space
Oops! Almost Dinomite!
1------------------------2------------------------3------------------------4------------------------5
Some Most All

Criteria: Appropriateness of Pictures
Oops! Almost Dinomite!
1------------------------2------------------------3------------------------4------------------------5
inaccurate Mostly Accurate Accurate Details

Criteria: Presentation
Oops! Almost Dinomite!
1------------------------2------------------------3------------------------4------------------------5
No thought Some thought Smooth

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Scoring Form for Writing

	WOW! 4	Good! 3	Fair! 2	Needs Improvement 1
Neatness	Very Neat Good Handwriting Proper Spacing	Kind of Neat Okay Handwriting Okay Spacing	Not too neat Sloppy H.W. Improper Spacing	Messy Poor H.W. No Spacing
Capital Letters and Punctuation	All necessary words Capitalized and all Punctuation correct	Most Capitalized & Punctuated	Few	None
Form	Indented Correctly Orderly form No Missing words Complete Sentences	Not Indented Orderly form Some missing words Complete Sentences	Not Indented Not Orderly A lot of words missing Incomplete Sentences	Not Indented Disorganized
Content	Logical Sequential Makes Sense Interesting	Good Ideas Lacking Interest or Connecting Thread	Lacking either Logic, Order, or Interest	No Effort Lacking a lot
Spelling	All Words spelled Correctly	Most Words spelled Correctly	Some Words spelled Correctly	Few Words spelled Correctly

Writer: ______________________________

Evaluator: ______________________________ **Date:** ______________

Primary Trait Evaluation Form: Sentence About a Picture

(Use this form to evaluate the Unit 1 Writing Test on page 1.)

General Purpose: write about a picture about yourself

Specific Purpose (explain briefly): ______________________________

Audience: ______________________________

Primary Trait Objectives:

- The writer tells about a picture.
- The writer tells a complete thought.
- The writer uses words that convey exactly what he or she means to say.
- The writer capitalizes and punctuates the sentence correctly.

Circle the overall rating.

Rating Scale

0	1	2	3	4
unscorable	**below average**	**average**	**above average**	**superior**

COMMENTS: ______________________________

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SENTENCE ABOUT A PICTURE (Level 2, Unit 1)

1A. I would be swinging with my friend. I would Swing the highest.

SCORE: 4 (Superior)

Meets all primary trait objectives. Indicates a personal response to the picture. Each sentence begins with a capital letter and ends with the correct end mark.

SENTENCE ABOUT A PICTURE (Level 2, Unit 1)

1B. If I woud go to the park, I woud be swiging on the swigs, I woud get on the swigs. And start swiging my Legs back and forth to make me go.

SCORE: 3 (Above Average)

Meets most primary trait objectives. Conveys the feelings of the writer and tells about the picture. Is not capitalized or punctuated correctly.

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SENTENCE ABOUT A PICTURE (Level 2, Unit 1)

1C. I wood Play baskedall and Play sokcer.

SCORE: 2 (Average)

Meets some primary trait objectives. Tells a complete thought. Not as detailed.

SENTENCE ABOUT A PICTURE (Level 2, Unit 1)

1D. roller sateing Becauve it's fun!.

SCORE: 1 (Below Average)

Fails to meet primary trait objectives. Is not a complete thought. Is not capitalized or punctuated correctly.

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Performance Assessments

Unit 1 Project: Make a Helping Hands Puppet

Goal

The child will identify a person who helps him or her and what the person does to help.

Suggestions:

1. Have children review the unit to find pictures of people who help, or have them brainstorm a list of people they see often and discuss what some of these people do.
2. To model the process, give an example of someone, such as a spouse or colleague, who helps you, describe some of the things the person does, and make a puppet of your own.

Portfolio Opportunities

Have children evaluate their puppets by telling you what is good about them. Then have children display their puppets in the classroom or place them in their portfolios.

SCORING RUBRIC

4 An **excellent** puppet has a paper hand glued onto a craft stick. It includes the child's name, a picture of a person who helps (such as a parent or grandparent, teacher, brother or sister, bus driver), and five things that the person does to help the child. Helpful things the person does should be described in words or phrases (on the fingers of the hand) written with correct spelling, for example: Mother makes meals, helps me get dressed, takes care of me, drives me to school, reads to me.

3 A **good** puppet includes the child's name, a picture of a person who helps, and four things that the person does to help the child. These things are described in words or phrases written with generally correct spelling.

2 A **fair** puppet includes a picture or the name of a person who helps and three things that the person does to help the child. It may also include things that the person does that do not directly help the child. Words and phrases are written with recognizable spelling.

1 A **poor** puppet includes a picture or the name of a person who helps and only one or two things that the person does to help the child, or it may include things that the person does that do not directly help the child. Words and phrases may not use recognizable spelling.

0 An **unscorable** puppet does not include a picture of a person or things that the person does to help the child, or it has words that are not readable.

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BUILD A DINOSAUR

Assignment: Build your favorite dinosaur or any dinosaur out of clay and/or other materials. Put your dinosaur in an appropriate background setting. ie: shadow box/ shoe box.

Scoring of Project

Criteria: Model of dinosaur
Oops! Almost Dinomite!
1--------------------2--------------------3--------------------4--------------------------5
Unrecognizable Looks somewhat like a Dinosaur Great detail

Criteria: Background (appropriate to Dinosaur times)
Oops! Almost Dinomite!
1--------------------2--------------------3----------------------4-----------------------5
Inappropriate Some are/Some not Appropriate

Criteria: Background (use of materials)
Oops! Almost Dinomite!
1--------------------2---------------------3----------------------4-----------------------5
No extras Some extras Creative extras

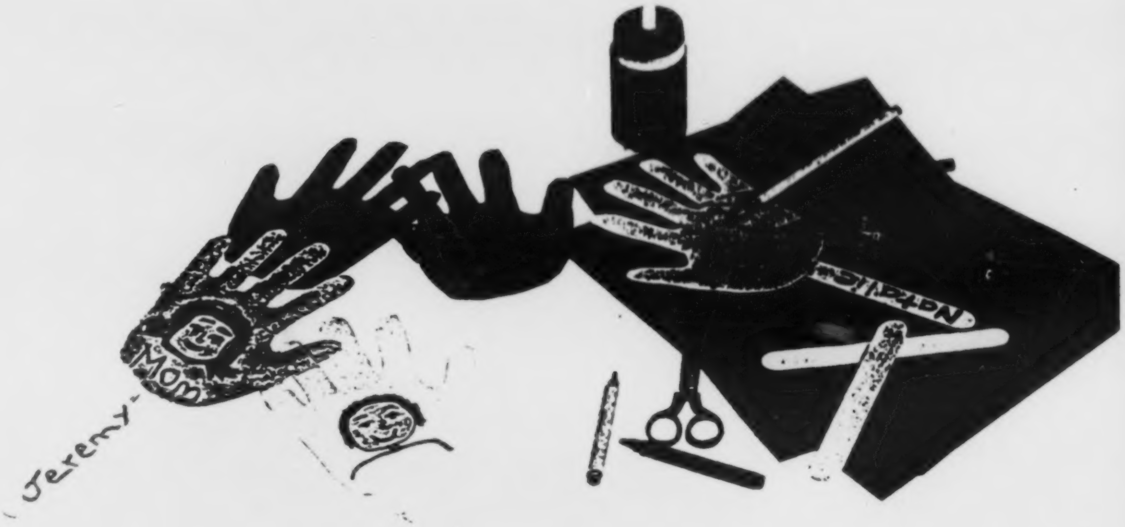
Criteria: Presentation
Oops! Almost Dinomite!
1----------------------2---------------------3----------------------4----------------------5
Needs more rehearsal Good, but room for improvement Smooth

Criteria: Self Reflection
Oops! Almost Dinomite!
1----------------------2-----------------------3---------------------4---------------------5
No thought Some Thought Able to tell how and why made

UNIT PROJECT

Make a Helping Hands Puppet

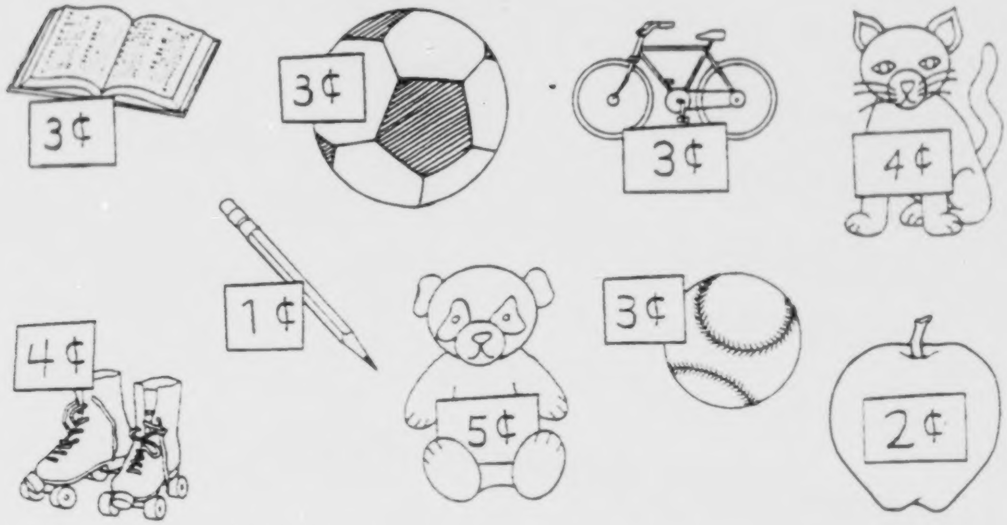
- Trace your hand onto a piece of colored paper.
- Cut out the hand.
- On the hand, draw a picture of a person who helps you. On the fingers, write ways that person helps.
- Glue your picture to a stick.
- Write your name on the stick.
- Share your Helping Hands Puppet with a partner.



Name ______________________________ Date ______

Performance Assessment Task 2

Walk By and Buy



1 What can you buy for 9¢?

____

2 What else can you buy for 9¢?

____

3 What is the greatest number of items you can buy for 12¢? ______

Tell how you decided. ______________________________

____

4 What is the fewest number of items you can buy for 12¢? ______

Tell how you decided. ______________________________

____

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Appendix M
Conference Survey - Second Grade

Name________________________________Date____________________

Rate yourself as a student here at Lincoln School.
Think about how you are for the whole day. **Be Honest!**

Circle one number for items 1 - 10.

	I Could Do Better		I Do Okay		I Do Great
1. I try hard to do my best in all my work.	1	2	3	4	5
2. I raise my hand and participate in class.	1	2	3	4	5
3. I pay attention and listen in class.	1	2	3	4	5
4. I ask questions when I don't understand.	1	2	3	4	5
5. I use my time wisely.	1	2	3	4	5
6. I get all my work done.	1	2	3	4	5
7. My behavior in class (is)...	1	2	3	4	5
8. I do my homework every night.	1	2	3	4	5
9. I keep my desk neat.	1	2	3	4	5
10. I respect others and get along with everyone in my class.	1	2	3	4	5

11. My best subject is ____________________, because ________________________

____

12. My hardest subject is __________________, because ________________________

____

13. I am not very good at ____

14. My plan to be an even better student is to _________________________________

15. One thing I want my teachers and parents to know is _________________________

____

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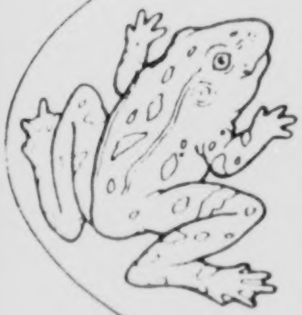
Name

Compare and contrast

Frogs and Toads

Frogs and toads are similar in many ways, but different in others. Read the diagram to find out the ways.



Frogs	Frogs and Toads	Toads
soft, smooth skin	lay eggs in or near water	bumpy, thick skin
slender bodies	start life as polliwogs	plump bodies
long back legs	have long, sticky tongues for catching bugs	short legs
live in or near water		live on land
found in groups	make croaking sounds	found alone
leap (long jumps)	hibernate in winter	hop (short jumps)

Write three sentences that tell how frogs and toads are **alike** and three that tell how they are **different**.

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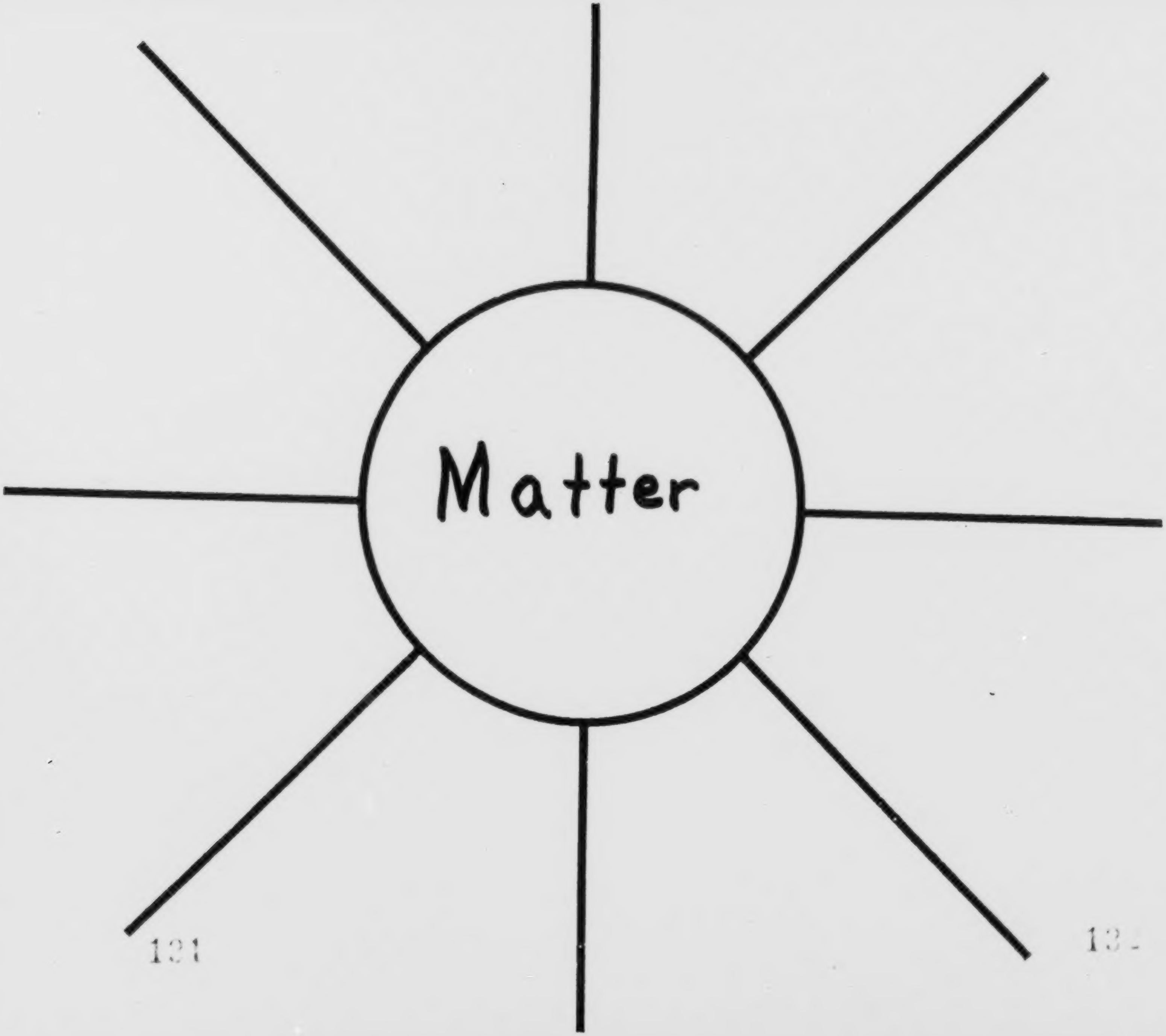

Matter

THE KWL

Topic: ______________________

Know	**W**ant to know	**L**earned

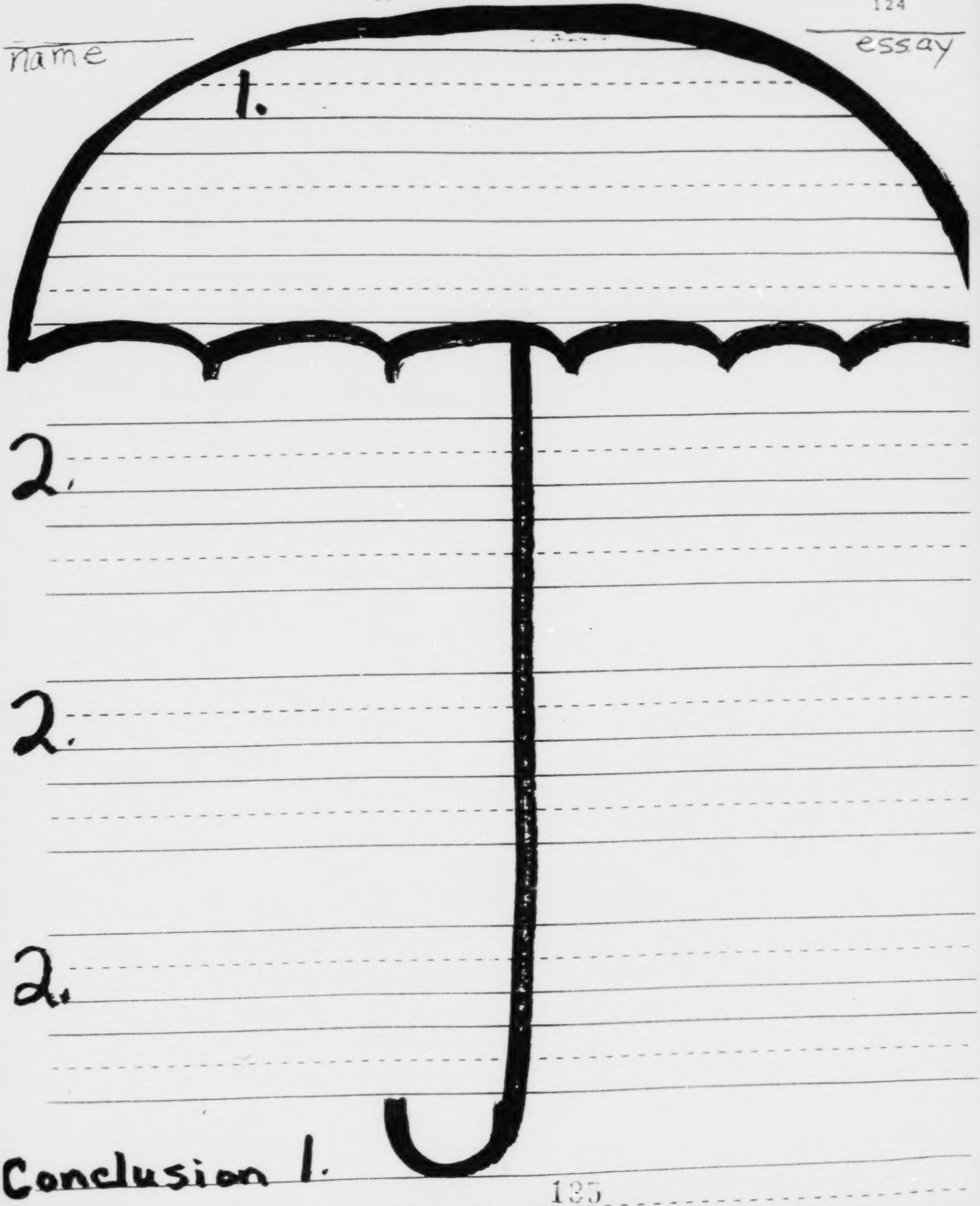
THE T-CHART

Topic ______________________________

Looks Like	Sounds Like

name

essay



1.

2.

2.

2.

Conclusion 1.

One Parargraph Essay

Name ____________________ Date ____________________

Power1

Indent ------------>

Power 2

Power 2

Power 2

Power 1

Appendix O

Perfect Classroom Proportion Sheet - Grade Seven

Scale :

1 cm = 0.18 m

* Measure to the nearest hundredth of a meter (cm)

* Calculate to the nearest tenth of a centimeter (mm)

NAMES ______________

____

____

	Objects	Proportion	LENGTH	Proportion	WIDTH
Ex.	Outline of Room	$\frac{0.18\text{ m}}{1\text{ cm}} = \frac{9.80\text{ m}}{x\text{ cm}}$	$x = 54.4$ cm	$\frac{0.18\text{ m}}{1\text{ cm}} = \frac{7.06\text{ m}}{x\text{ cm}}$	39.2 cm
1.	BIG Bulletin Board (grades)			X	X
2.	Windows (2)			X	X
3.	Chalkboards (2, same)			X	X
4.	Door			X	X
5.	Student Desks (31, same)				
6.	Table with trays				
7.	Overhead cart				
8.	Computer Table				
9.	Teacher's Desk				
10.	Filing Cabinet				

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Appendix P
Student Reflections - Grade Seven

Math and me

In math class I am not good at X or ÷ Some I can do but not high numbers. I don't like math most of the time because some things are hard for me to do. I have fun when I have easy things to do like when we started the school year. Math can be hard but I try to do my best. Last year I did bad in math I had a bad grade in middle of the year but I brought it up to a ok grade.

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Math and Me

I do not really like math class. I don't like it because it is my hardest subject in school. I usually get a bad grade in math. I am not good at multiplying or long division. When I am taking a test I get nervouse and usually forget all that I learned on that chapter. When I do my homework I always have to get help or use a calculator. That is why I do not like math.

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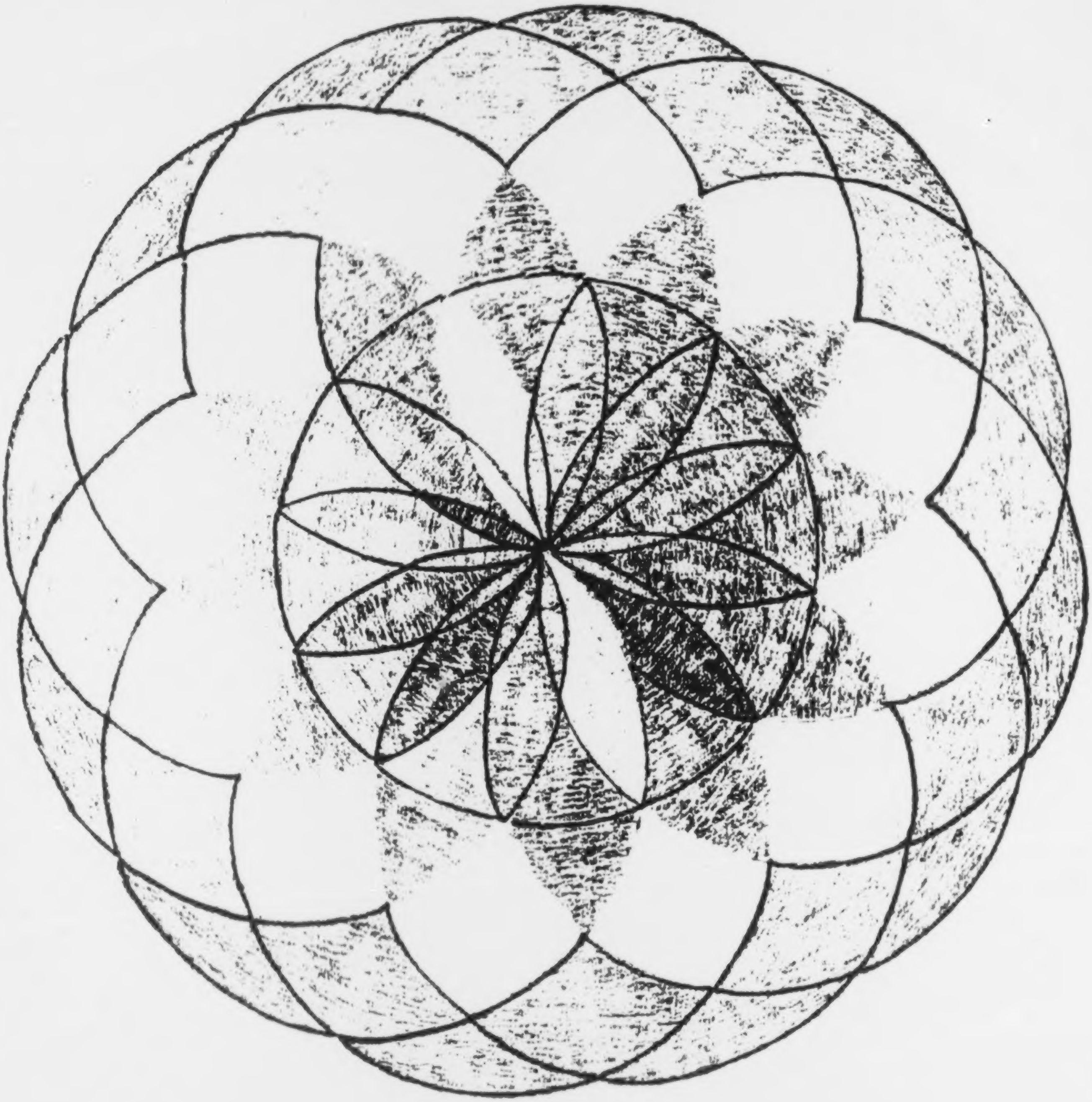
Appendix Q
Creative Projects - Grade 10



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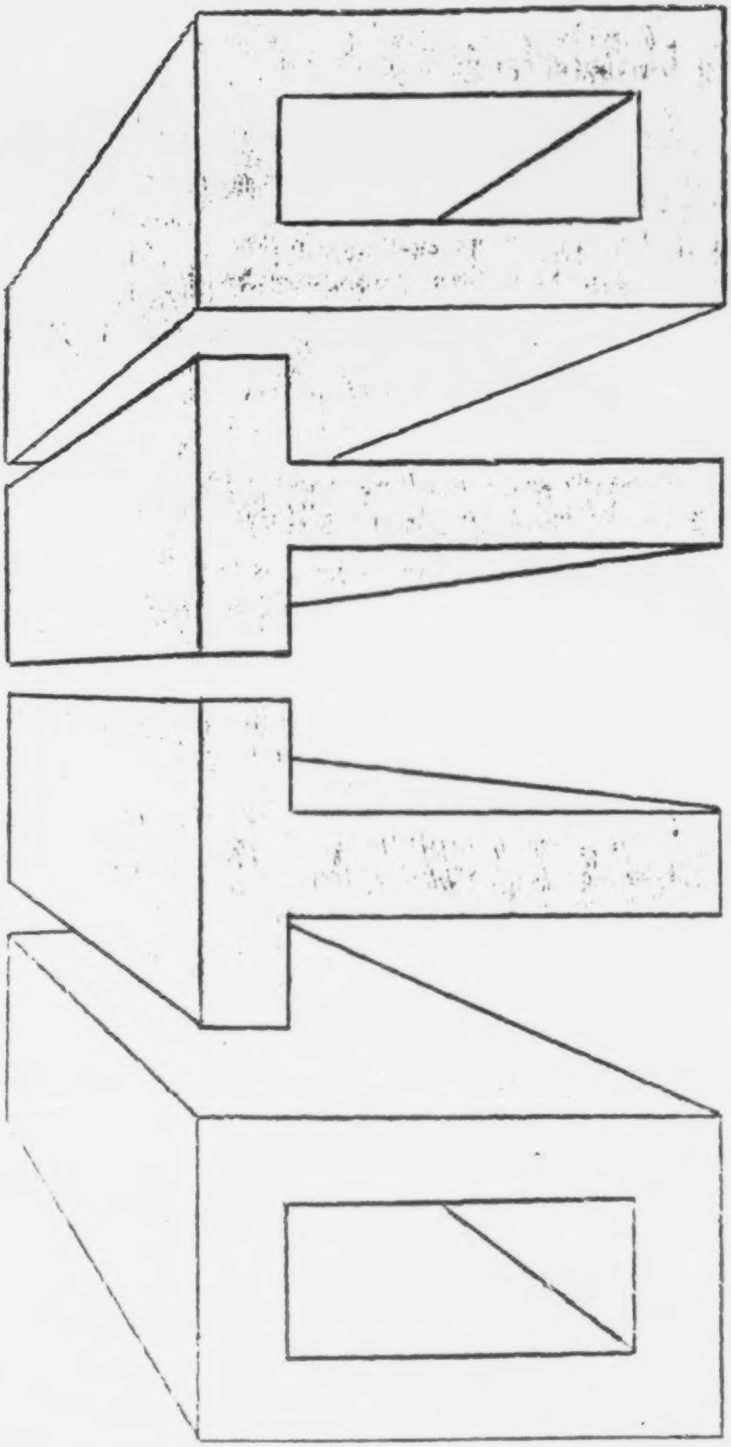
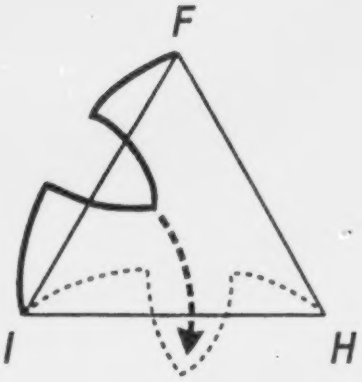
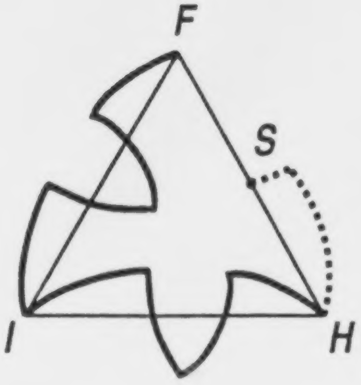




Step 1



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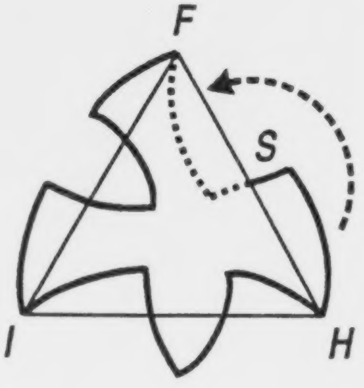

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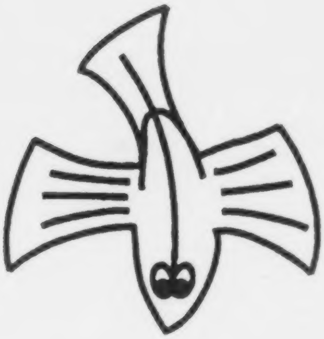

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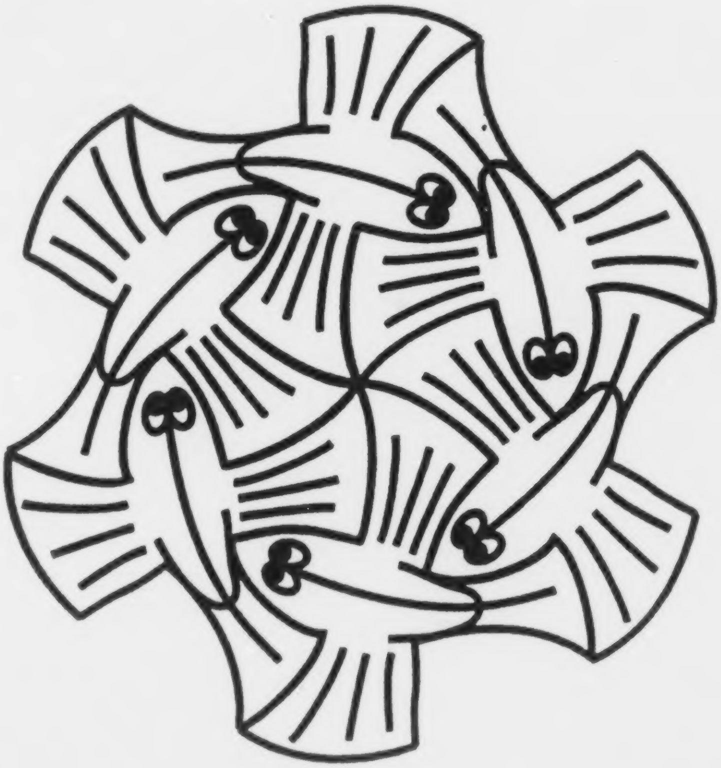

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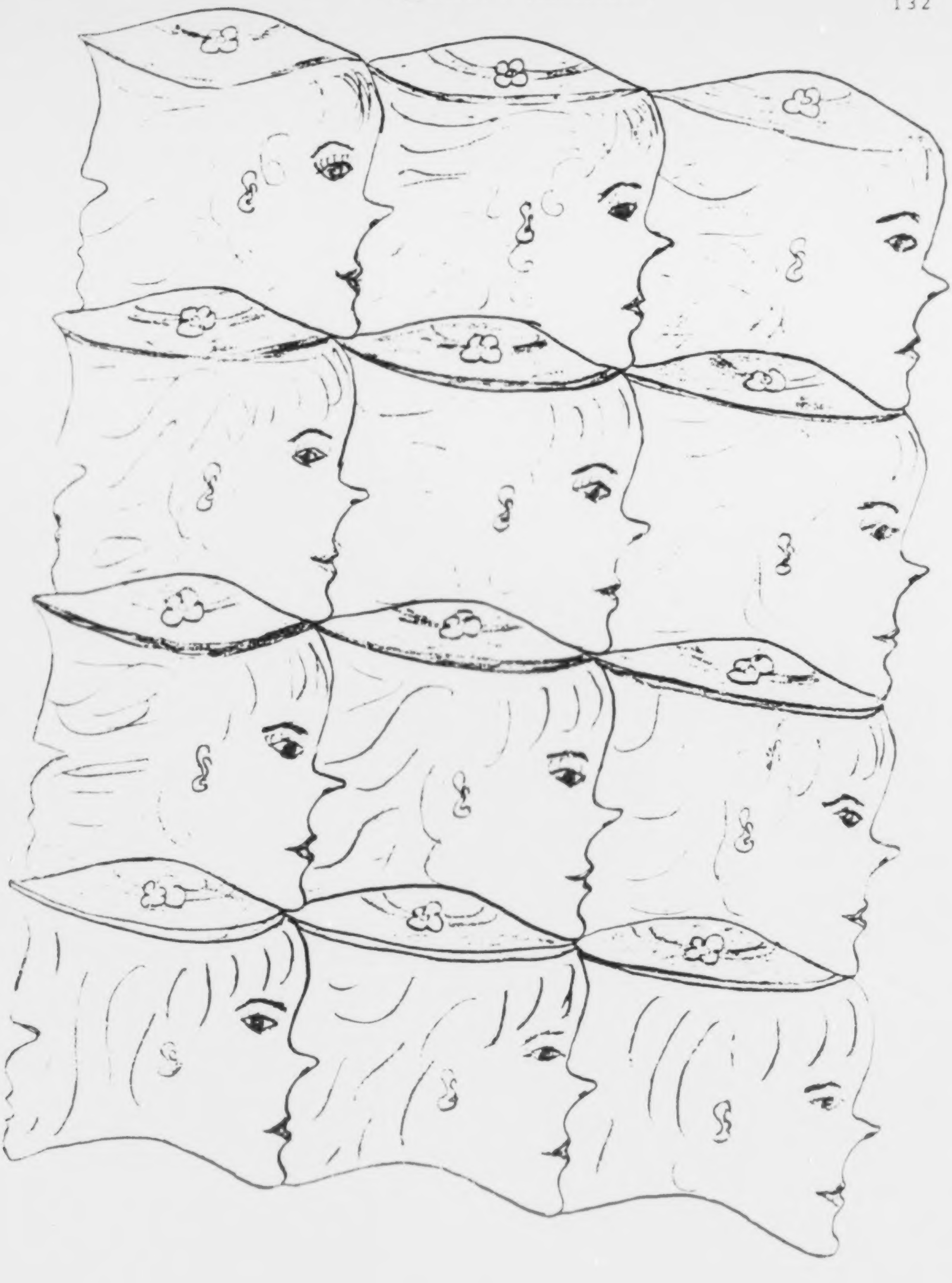

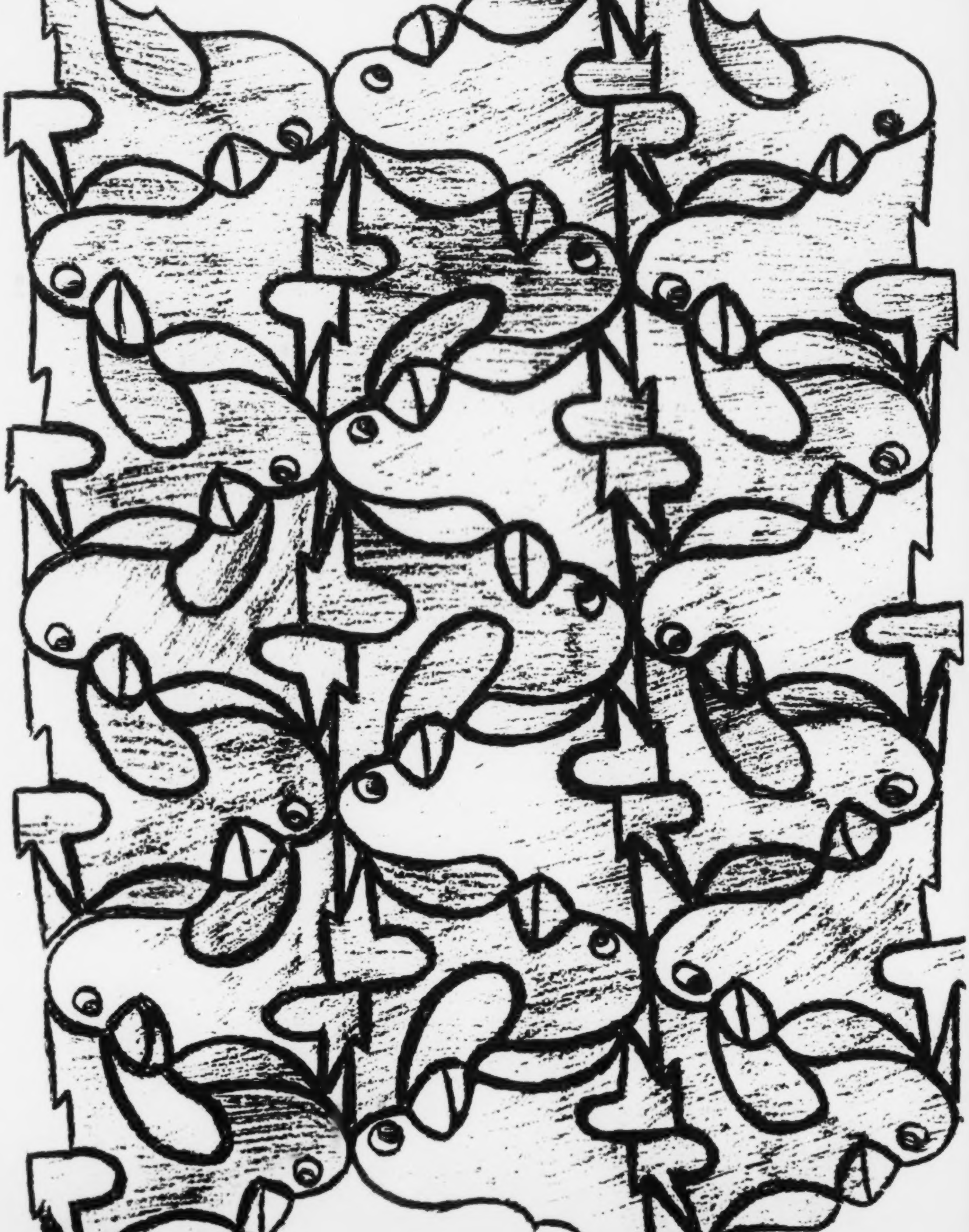

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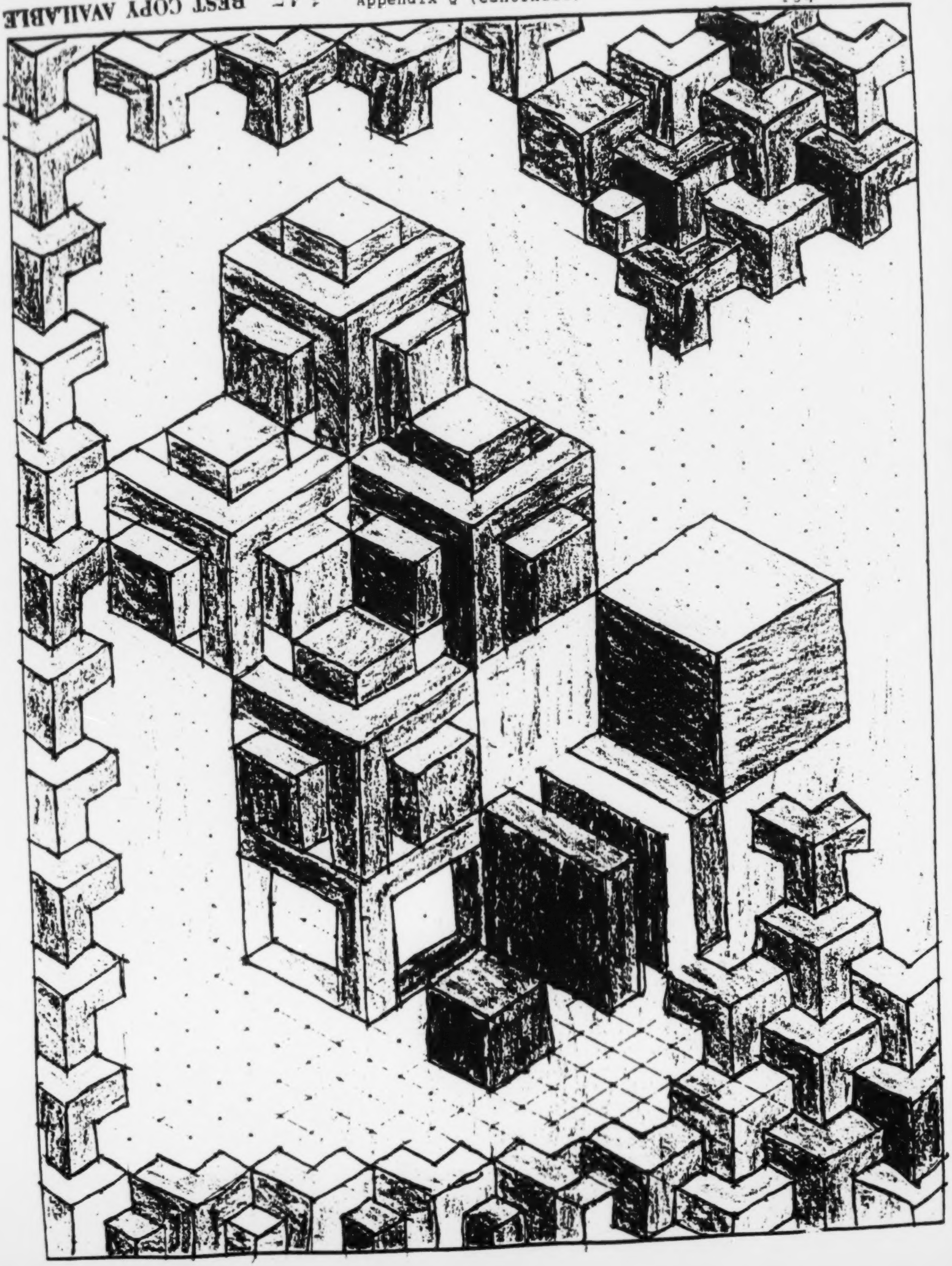

Appendix R
Student Reflections on Introductory Chapter - Grade Ten

STUDENT REFLECTION ON CHAPTER 0

1. What did you enjoy about Chapter 0?

It was fun making the drawings. It was different than the normal things you do in a math class.

2. What did you like least about it?

I thought the block letters were confusing at first + then easy once I understood it

3. If you were teaching Chapter 0, how would you describe the purpose of teaching it?

I would say the purpose was to show how much geometry and other math is used around us when we don't know it

4. What did you find interesting about the reading?

I thought it was interesting that so many people so early in history used geometry + geometric designs in their art + that they were used symbolically

5. What can you take from what you have learned so far and apply it in real life?

You can look at things in nature and realize now that they contain geometric designs.

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STUDENT REFLECTION ON CHAPTER 0

1. What did you enjoy about Chapter 0?

It was fun making the drawings. It was different the normal things you do in a math class.

2. What did you like least about it?

I dislike the line designs. It was kind of boring drawing lines.

3. If you were teaching Chapter 0, how would you describe the purpose of teaching it?

To show how much geometry & other math is used around us when we don't know it

4. What did you find interesting about the reading?

I thought it was interesting that so many people so early in history used geometric shapes and uses for religious effects and ways of life.

5. What can you take from what you have learned so far and apply it in real life?

Nature uses geometry. Geometric shapes can be found in natural & made objects.

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Problem Solving EVALUATION

Name: ______________________ Date ____________

1. Tell briefly how you approached the problem. What were the strategies and/or techniques that you used to get started?

We approached as a group – strategies we used are how everyone communicated and got along. Everyone was given a job to do and they carried out their duties

2. What different ways did you organize all of you materials/information?

We made the diagram of the room and measured what we needed to measure. Record measurements on the area of the diagram

3. How did you solve the problem? What techniques made you feel successful?

(add measurements – perimeters)

Measure the areas, mathematically compute what numbers you have to use, and you will find the amount of pennies you need.

4. How do you feel about the way the process worked for you? What are some things that might have made it easier for you? What were some strategies other students used that made sense to you?

I feel good about the way the process worked for me. I have no complents.

Problem Solving EVALUATION

Name:______________________________Date__________

1. Tell briefly how you approached the problem. What were the strategies and/or techniques that you used to get started?

First looked at the shape of the room and analyzed it as you would do h.w and figured out what lengths were needed

2. What different ways did you organize all of your materials/information?

We wrote down on a piece of paper first the measurements then we sat down and did the calculations

3. How did you solve the problem? What techniques made you feel successful?

working together as a group was was worked the best because we have an answer to what one of us doesn't understand. We solved it by working together.

4. How do you feel about the way the process worked for you? What are some things that might have made it easier for you? What were some strategies other students used that made sense to you?

I feel I understood what our goal with this project was which makes it easy to understand what to do next. I think that if we'd have been told what to measure it would of been easier but!, it would've been no fun.

Appendix S (continued)

Problem Solving EVALUATION

Name: ______________________ Date ____________

1. Tell briefly how you approached the problem. What were the strategies and/or techniques that you used to get started?

I just tried to divide the area into smaller, easier to measure areas. Then I basically started measuring one wall at a time.

2. What different ways did you organize all of you materials/information?

I organized my information by drawing the shape of the room on my paper and putting each measure next to the corresponding wall. I also put each measurement on the [illegible] and labeled it right wall, left wall, etc.

3. How did you solve the problem? What techniques made you feel successful?

We solved the problem by performing the operations needed when we had all of measurements. It made me feel successful when we could actually see the numbers that went along with our measurement.

4. How do you feel about the way the process worked for you? What are some things that might have made it easier for you? What were some strategies other students used that made sense to you?

The process worked well. It would have been easier if we would have had figures to compare ours to - to see if they were accurate. It would have been better if we were more organized so others would have listened to my ideas. Some students also divided the area into

150

Appendix T
Student Reflections on Area - Grade Ten

8.5

① What were you supposed to do?

We were supposed to divide each large shape into smaller shapes to find the area.

② Why?

By dividing each shape into smaller shapes, it is easier to find the area of the total area/shape. Without dividing it would be hard to use a formula to find the area.

③ What did you have trouble with?

I had trouble deciding how to divide the shapes. Some of the ones with curves, etc. were hard to be accurate with.

④ How could you + your group do it better next time?

Next time we could each divide the shapes differently so we could use all of the formulas to then decide if our answers were accurate.

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Reflection 8.4

PMI

Pluses	Minuses	Interesting
1. we were able to learn how to do this-and we may actually have to do this in real life	1. It was hard to determine what formula to use for some shapes	1. It was interesting to see how by figuring out one thing you can use it for others (used area to figure out gallons of paint, etc
2. It was relatively easy to do once you understood it.	2. It was hard to decide if you needed to determine a certain wall's area or determine if you didn't need to use it	2. Interesting to see that something may look small just looking at it, but is really big in terms of sq. in + sq. ft, etc.

Art: Daisy Designs

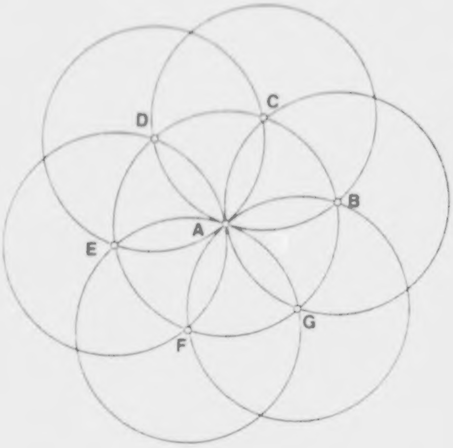
A daisy design is a simple design that can be created using only a compass. From the basic daisy, you can create more complex designs based on the regular hexagon. This activity will give you practice using the freehand tools to construct objects to points of intersection.

Sketch

Step 1: Construct circle *AB*.

Step 2: Construct circle *BA*.

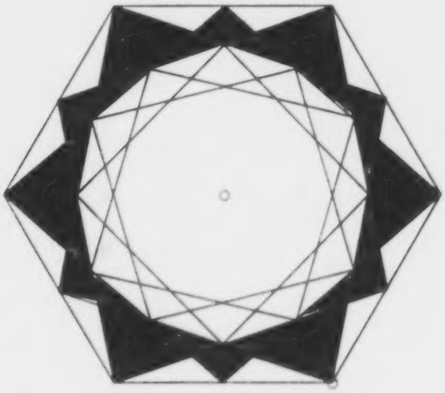
Step 3: From the points of intersection of these circles, continue constructing circles to existing points. (All these circles should have equal radii.) Points labeled here show one possible order for constructing these circles: *CB*, *DC*, *ED*, then *FG* and *GF*. Construct *FG* instead of *FE* to avoid having three intersecting circles without an intersection point.

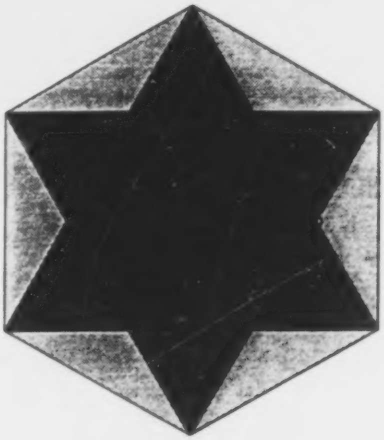


Step 4: If your last circle refuses to be constructed, you're probably releasing the mouse on the intersection of three circles. In this case, select two circles and construct their intersection with the Construct menu. Then use this point to construct your final circle.

At this point, you may wish to use the Segment tool to add some lines to your design. You could construct circle and polygon interiors and experiment with shading, but you can probably get better results by printing out the basic design and adding color and shading by hand.

The six points of your daisy define six vertices of a regular hexagon. You can use these points as the basis for hexagon or star designs like these shown below. Once you have all the lines and polygon interiors you want, you can hide unneeded points. You probably don't want to hide your original two points though, as you can use these points to manipulate your figure.





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MAC LAB - DAY TWO

ACTIVITY

1. Construct a triangle (segment tool).

2. Construct a centroid in the triangle.
   - a. Select all three segments.
   - b. CONSTRUCT - "Point at Midpoint"
   - c. Construct the three medians - use segment tool to connect the three midpoints to the opposite vertices.
   - d. Select two of the medians.
   - e. CONSTRUCT - "Point at Intersection"

3. What can we find out about the area of the six small triangles?
   - a. Select the three vertices of one of the little triangles.
   - b. CONSTRUCT - "Polygon Interior"
   - c. Change its color (DISPLAY menu)
   - d. While it is still selected, MEASURE - "Area"
   - e. Repeat steps (a-d) for at least two other small triangles.
   - f. Make a conjecture: ______________________________

     ____

     ____

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Investigation: Properties of Isosceles Triangles

In this activity you'll learn how to construct an **isosceles triangle** (a triangle with at least two sides the same length). Then you'll discover properties of isosceles triangles.

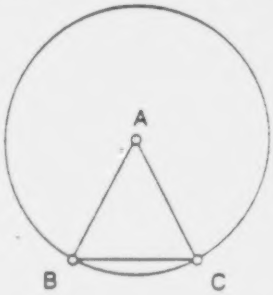
Sketch

Step 1: Construct a circle AB.

Step 2: Construct $\overline{AB}$.

Step 3: Construct $\overline{AC}$ with point C on the circle.

Step 4: Construct $\overline{BC}$ and hide the circle.



Investigate and Conjecture

Drag different parts of your triangle to see how they affect your figure. Do you see why different points act in different ways? How do you know your triangle is isosceles, without measuring the sides? Measure angles $\angle ABC$ and $\angle ACB$. (These are called the **base angles** of the isosceles triangle.) Write a conjecture about the base angles below

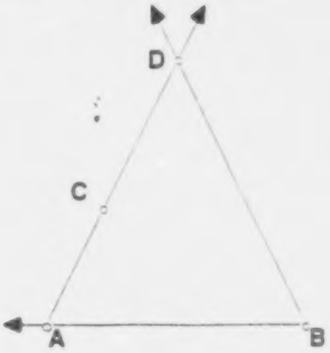
Sketch

Step 5: In a new sketch, construct $\overline{AB}$, ray $\overrightarrow{AC}$ and ray $\overrightarrow{BA}$.

Step 6: Select C, A, and B and choose Mark Angle in the Transform menu.

Step 7: Mark B as center in the Transform menu and rotate $\overrightarrow{BA}$ by the marked angle.

Step 8: Construct the point of intersection, D, of this ray and $\overrightarrow{AC}$.



Your construction guarantees that the base angles of ΔABD are equal. Measure AD and BD. What else can you say about ΔABD? Write your findings as a conjecture. This should be the converse of the conjecture above.

Present Your Findings

Discuss your results with your partner or group. To present your findings you could:

1. Print a captioned sketch showing several different isosceles triangles and the measures of the angles. Write about your findings.
2. Record and comment a script to construct an isosceles triangle, then demonstrate your construction and findings to a classmate.

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Investigation: Properties of Rectangles

A **rectangle** is a quadrilateral with four right angles. In this investigation, you'll discover that a rectangle has many special properties besides its equal angles.

Sketch

Step 1: Construct $\overline{AB}$.

Step 2: Construct lines perpendicular to $\overline{AB}$ through A and B.

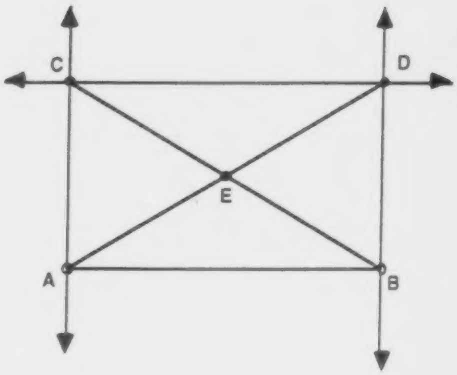
Step 3: Construct $\overline{AC}$, where C is on one of these lines.

Step 4: Construct a line through C perpendicular to $\overline{AC}$.

Step 5: Construct $\overline{CD}$ and $\overline{DB}$, where D is the intersection of the perpendicular lines through C and B.

Step 6: Hide the lines.

Step 7: Construct diagonals $\overline{AD}$ and $\overline{BC}$ and their point of intersection, E.



Investigate

Measure the lengths and slopes of the four sides of rectangle $ABDC$. How are the sides related? (Make sure to manipulate your rectangle to confirm that these relationships hold for all rectangles.) Measure AE, ED, CE, and EB. What can you conjecture about the diagonals of a rectangle? What kind of symmetry does a rectangle have?

Conjecture: Write your conjectures below.

Present Your Findings

Compare and discuss your results with your partner or group. To present your findings, you could print a captioned sketch showing measures that illustrate the properties of rectangles you discovered in this investigation.

Explore More

Use the properties of rectangles that you just discovered to invent new ways of constructing a rectangle. How many ways can you come up with? Here's a hint for one way to construct a rectangle using its symmetry properties: Construct a pair of perpendicular lines. Construct a point not on either line. The rest is up to you.

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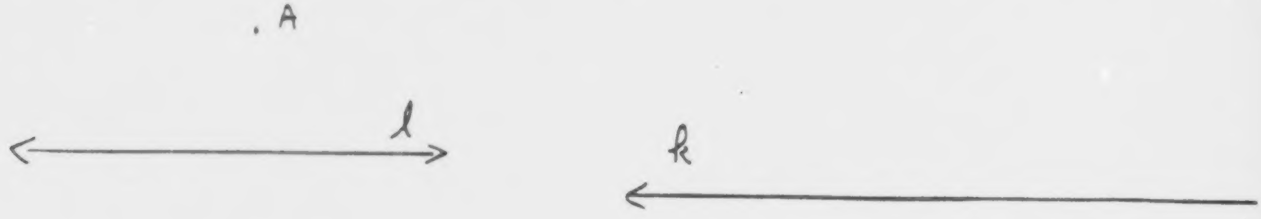
p259

W.S. I

You may use only a Right Δ to Do these constructions - Find a method that works for EVERY angle or segment - not just a few special angles or segments

①



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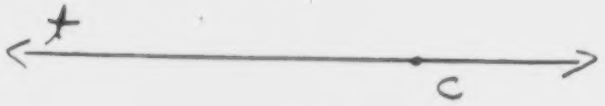
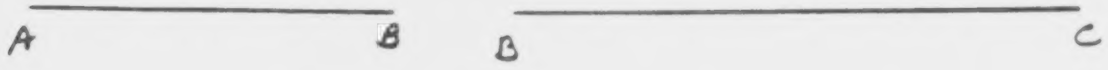


③ Rectangle below

Try Rectangle with sides $\overline{AB}$, $\overline{BC}$ Given Below

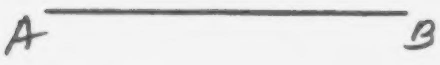


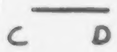
④

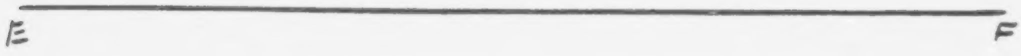
ⓐ A Rhombus THAT is NOT A SquARE

ⓑ A SquARE

⑤ ⊥ bisector



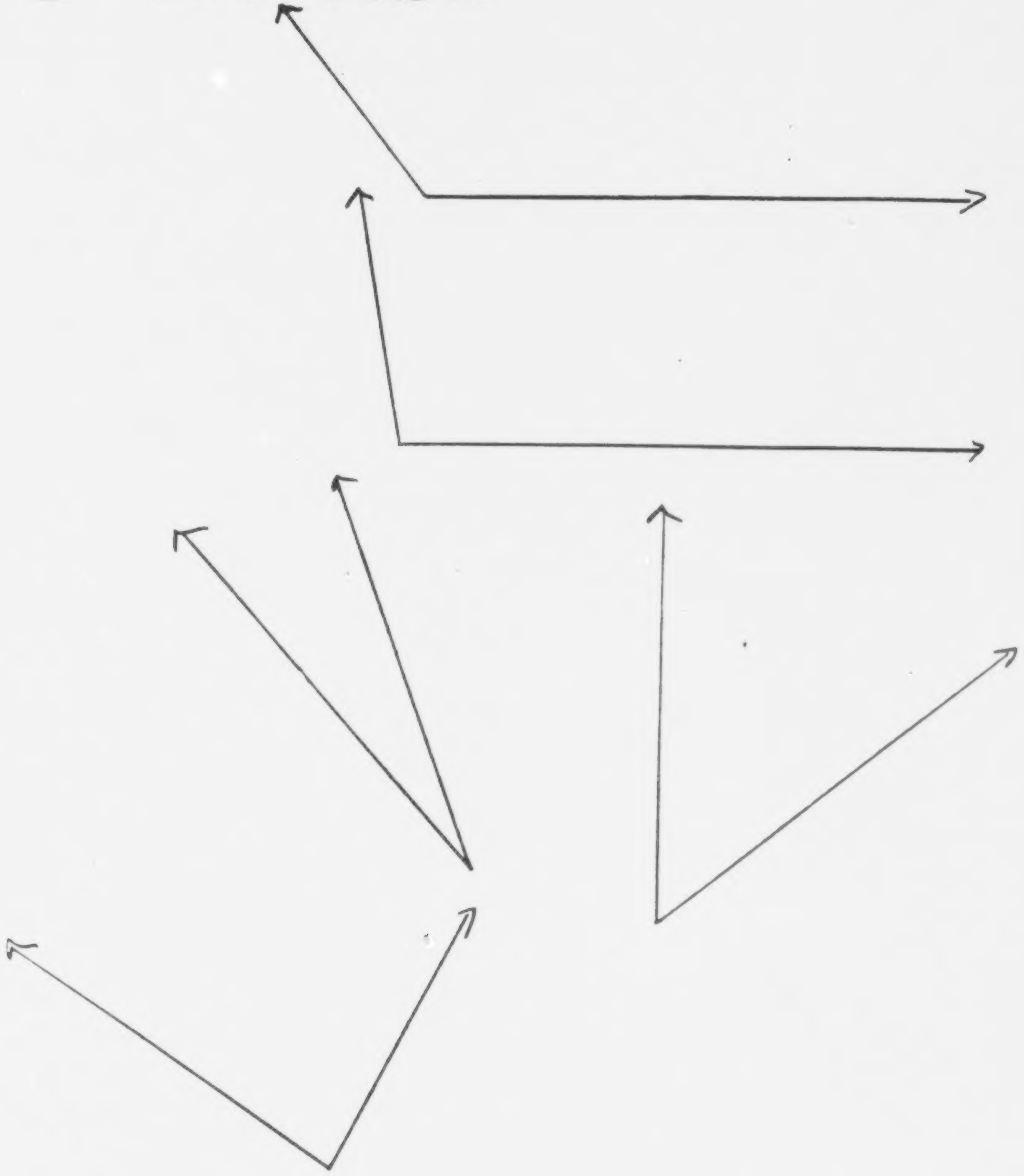




W.S. I

Appendix V (continued)

⑥ ANGlE Bisector



WS. II

You may use only parallel Lines (THE SIDES of your STRAIGHT edge to DO THESE CONSTRUCTIONS - YOUR METHOD Should work for ALL ANGLES AND SEGMENTS

① Rhombus [THIS is EASY - WHAT DO you know ABOUT THE DIAGONALS of A Rhombu

② RECTANGLE [CAREFUL you CAN'T USE RIGHT ∠S ON THE ENDS of YOUR STRAIGTED

SEE #1

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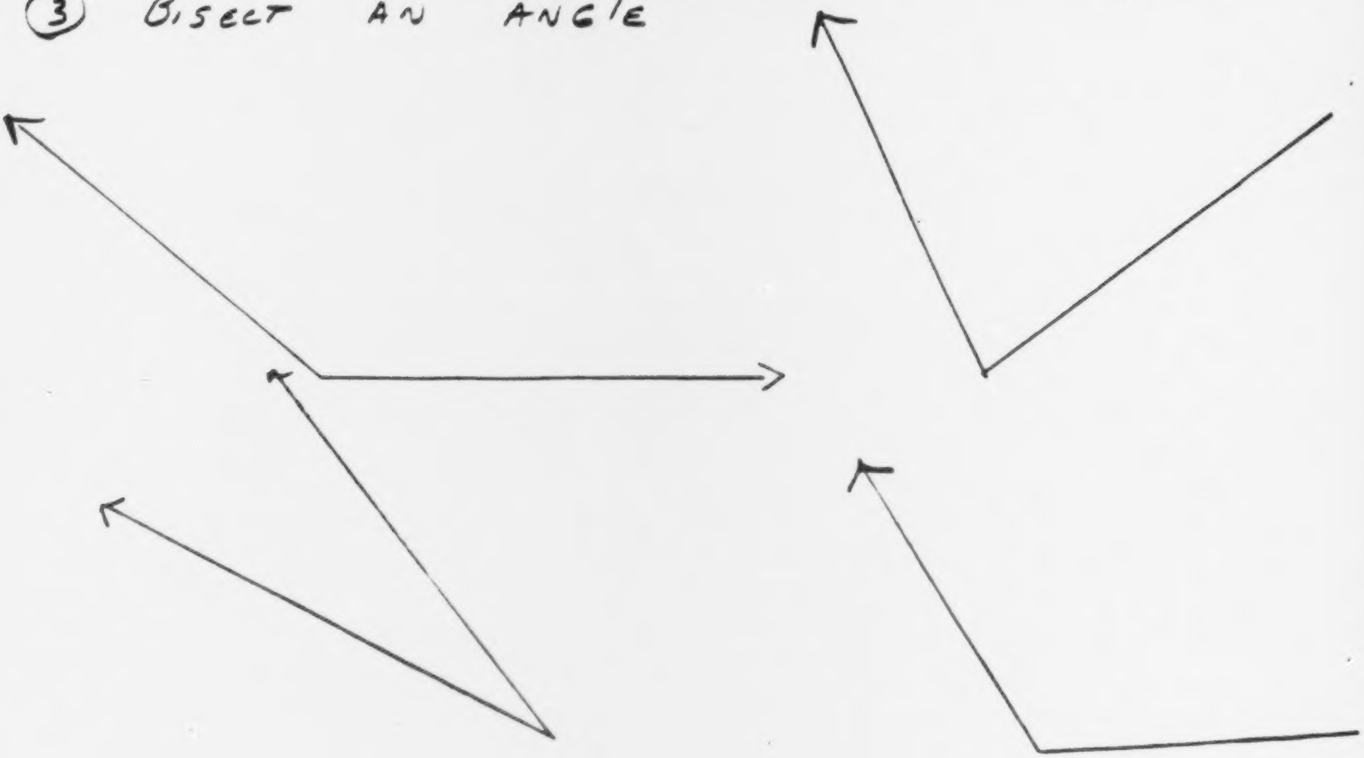
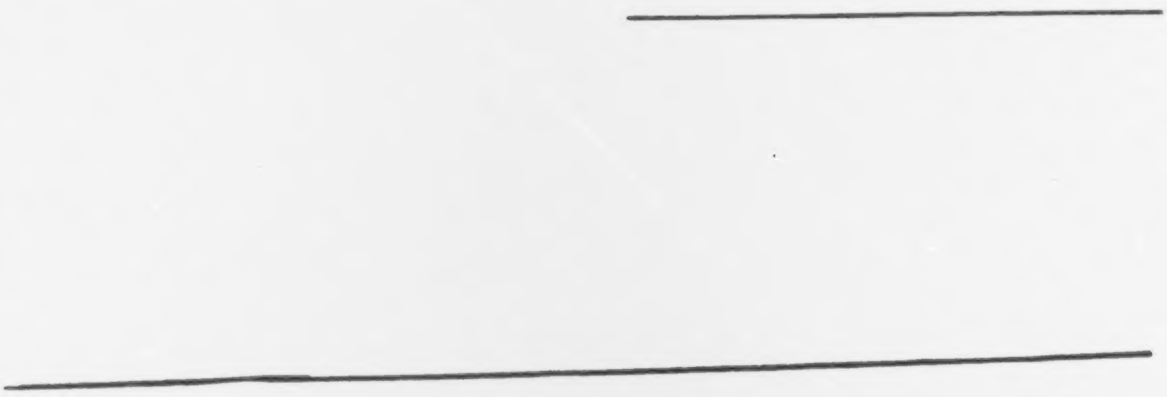
③ BISECT AN ANGlE

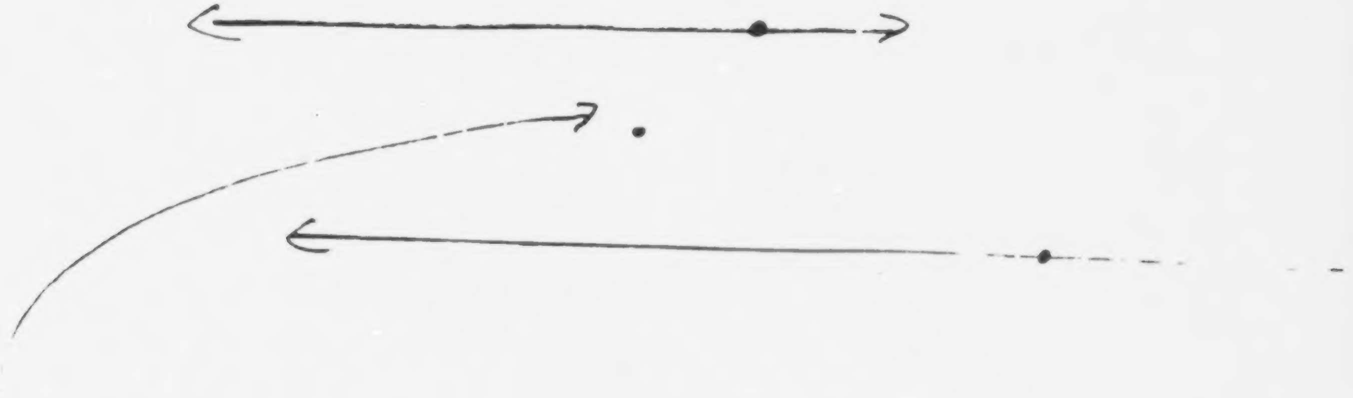


④ ⊥ bisector of a segment

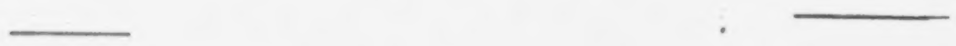


1 II

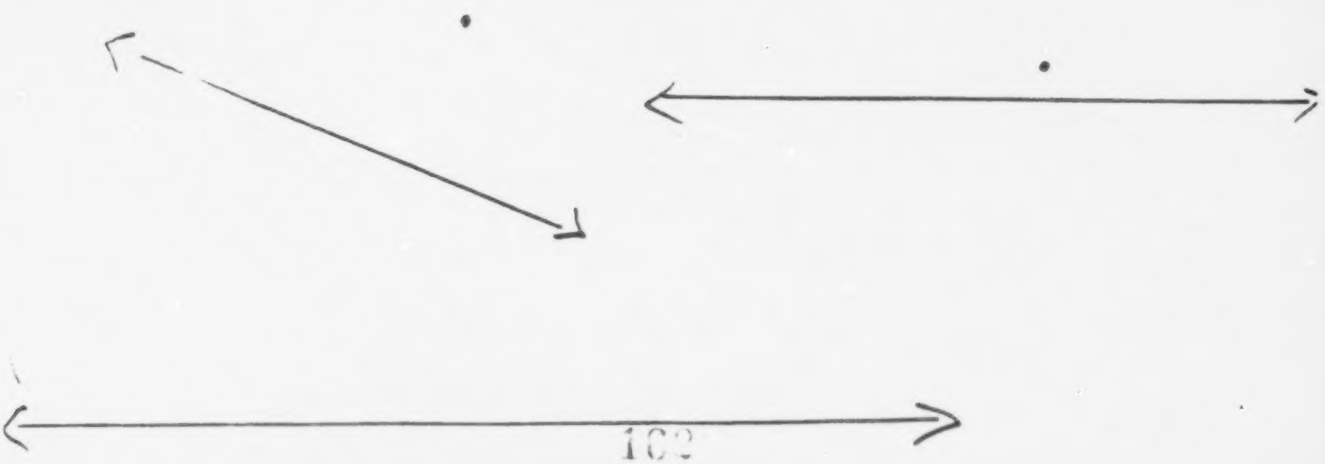
⑤ $\perp$ to a point on a line



⑥ $\perp$ bisector [segment shorter than distance betwe ∥ lines



⑧ $\perp$ from a point to a line - point not on line



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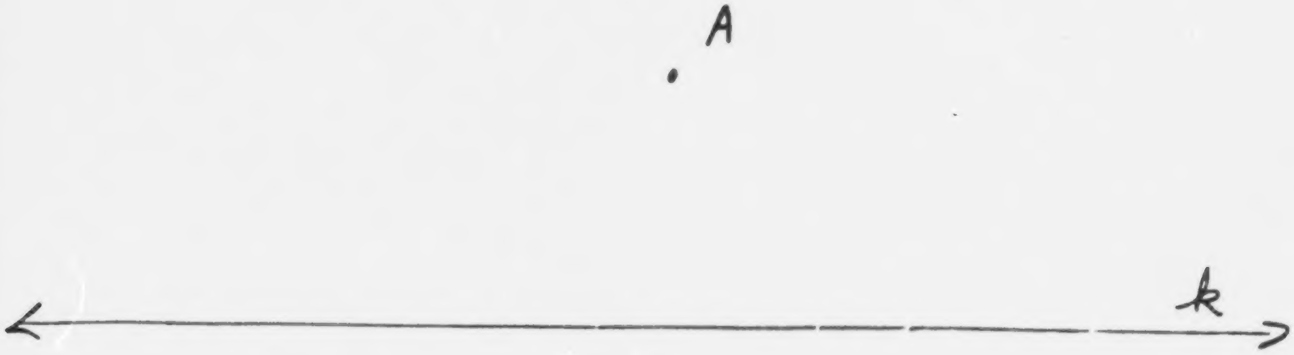
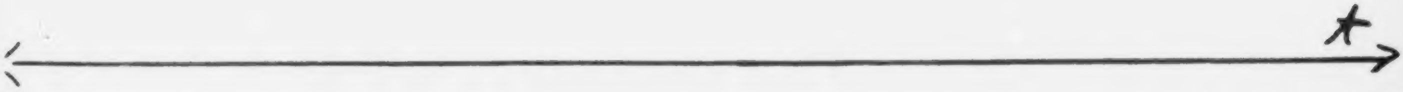
over #7

#7 II

Construct $l \parallel k$ with A on l



Construct $p \parallel t$ C on p



Appendix V (continued)

Chapter 3 Constructions – Jigsaw Project

Directions: Each group member must know and practice how to do the contructions they are responsible for. Each person teaches the rest of the group each construction. Each construction will then be done on the packet attached. Each group member turns in a completed packet.

Assignments:

Member #1:	Duplicate segments, angles, and triangles Angle Bisector Incenter
Member #2:	Perpendicular Bisector of a Segment Parallel Lines – Rhombus Method Circumcenter
Member #3:	Perpendicular from a Point to a Line Altitude Orthocenter
Member #4:	Parallel Lines – Equidistant Method Median Centroid

Note: For a 3-person group, each person would take their three constructions for members #1 - #3 and pick a 4th one from the #4 group.

LENART SPHERE, WORKSHEET #2

CAN YOU CREATE A GLOBE FROM A FLAT MAP?

INSTRUCTIONS:

1. On the attached pages, you will find eight polar polyconic map projections of different sections of the earth's surface. Use scissors to carefully cut out the four projections that make up the northern hemisphere, extending the slits to the end of the dotted lines. The more carefully you do your cutting, the better the projections will fit on your sphere.

2. Carefully arrange these four cutouts into a flat, circular projection of the northern hemisphere and tape them together near the pole. Drape the projection over the top of your sphere.

3. Next, gently rest a clean transparency on top of the projection so that the transparency's hole is directly over the pole. When every strip is in place, push the transparency down tightly to hold the projection in position.

4. Repeat Steps 1-3 for the southern hemisphere, being careful to line up the appropriate parts of the two hemispheres.

5. Find the North Pole, the South Pole, and the equator on your globe.

LENART SPHERE, WORKSHEET #3

1. What is the latitude of the North Pole?

2. What is the latitude of the South Pole?

3. What is the longitude of the North Pole?

4. What is the longitude of the South Pole?

5. Describe the location that is at the opposite side of the Earth from Belvidere.

6. Use a map to help you find Sydney, Australia and Cairo, Egypt on your globe. Mark the position of each city. Determine the distance, in degrees, between them. Convert this degree measure to kilometers. Remember that the equator measures 360 degrees and is approximately 40,000 kilometers long. Show your work!

7. Locate New York City on your geographic coordinate system. Determine its approximate distance, in degrees, from the equator. Locate some other geographic spots on the Northern Hemisphere that lie on the the same latitude. Repeat for the Southern Hemisphere. Determine if there is a connection between latitude and climate.

New York's distance from the equator ____________
Is there a connection between latitude and climate?_________

8. The moon can be coordinatized in the same way the Earth is. On the moon, the crater Archimedes is approximately at 0 degrees longitude and 30 degrees N latitude; the crater Ptolemaeus is approximately 0 degrees longitude and 10 degrees S latitude. What is the distance between them in degrees and in kilometers? The equator of the moon is about 11,000 kilometers long.

9. In some planar maps, latitude and longitude lines form a rectangular grid. Why are these maps inaccurate?

Appendix W
Student Course Reflections - Grade Ten

I like doing creative and/or artistic things. I think that we learn more because we're having fun while we learn. I love to work in groups. If you or somebody else doesn't understand how to do something you can help each other out. This way you don't waste your time waiting in line to ask the teacher. Also it's a little less intimidating asking 2 or 3 people how to do something than asking the question in front of the whole class. Sometimes working individually is okay because you need it quiet so you can concentrate, but the majority of the time I'd rather work in groups. It is understandable, though, that some projects must be done alone. I enjoyed going to the computer lab. It kind of gave us a break from what we usually do, yet we were still learning. I don't mind being graded on a portfolio. Most of the stuff in a portfolio we need for the test anyways. This way we organize everything and it helps that everything is organized when the time comes.

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1.) I believe that they encourage mind to interpret and understand concepts in a new, more visual perspective. Also, it makes it easier for visually inclined people to comprehend the concepts.

2.) Working in groups is beneficial to some students because it allows them to be helped with their work, others it helps to understand the work better from having to teach other students. Sometimes I feel as though it holds people back, though.

3.) Working individually is beneficial because it helps people figure things out on their own & move at their own pace.

4.) Doing investigations on the computer is beneficial because it lets students concentrate on the task rather than the constructions.

5.) Being graded on a portfolio gives students the opportunity to learn organization skills by keeping their old papers.

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Reflection (how is it beneficial or detrimental to your ability to learn)

What do you think about:

① Doing creative and/or artistic projects for grades
② Working in groups
③ Working individually
④ Doing investigations in the computer lab
⑤ Being graded on a portfolio.

① I think doing creative/artistic projects was beneficial. It is something I can use (I use block lettering) and it was fun and not hard to do. It was a break from the usual stuff we do.

② Working in groups is beneficial. It helps alot because you can hear other people's ideas about a problem. You learn more from working in groups.

③ I didn't like working individually. When working individually you don't get to compare your ideas with others. If you don't understand something if you were working in a group they could explain it.

④ Doing investigations in the computer lab was beneficial. These were beneficial because you are more able to visualize

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things. It is easier to visualize how changing one thing will change something else.

⑤ I think being graded on a portfolio is beneficial. It helps you keep things organized. It also helps to be graded overall instead of individually all the time.

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Reflection

what do you think about:

① Doing creative and/or artistic projects for grades - I enjoyed doing creative art projects for grades because it lets the not so artistic types learn more about drawing arts and its fun.

② Working in groups - This is great because maybe if you didnt understand, you could get help from group members. The lesson

③ Working individualy - Group work is better than working as individuals, so I would say I dont like working bymyself.

④ Doing investigations in the computer lab - Yes I liked working in the computer lab because I learned how to draw shapes and things using computers.

⑤ Being graded on a portfolio - I think this is fair because if you get everything done thats supposed to be in it you'll get a good grade.

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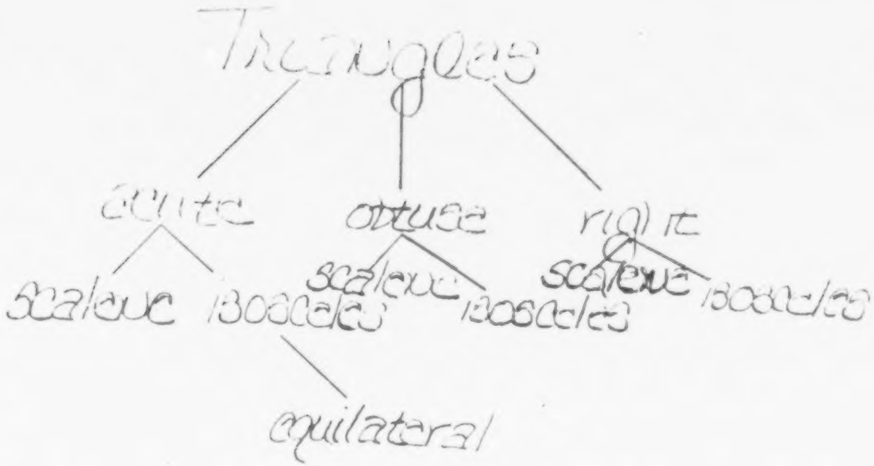
Tree Diagram for Triangles


Triangles
acute
obtuse
right
scalene
isosceles
scalene
isosceles
scalene
isosceles
equilateral

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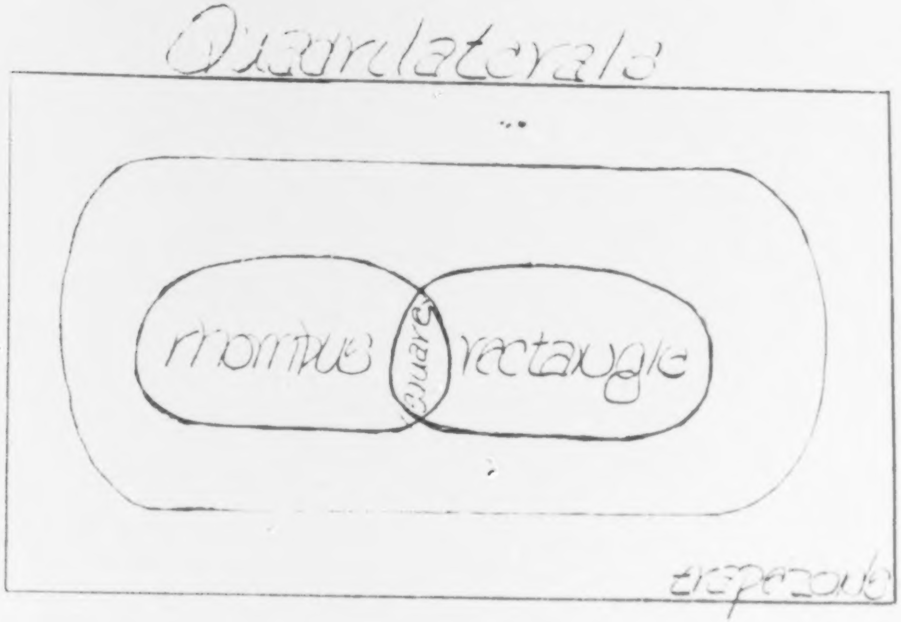
Venn Diagram for Quadrilaterals


Quadrilaterals
rhombus
square
rectangle
trapezoids

Identity

Learning About My Team

Answer the questions below individually. Then, one question at a time, share your answers. Please answer your questions as a complete sentence.

1. One reason I don't let people know me too well is ...

2. If I knew for sure I wouldn't be laughed at, I would ...

3. One thing that upsets me a great deal is ...

4. One time I was embarrassed was when ...

5. If I could have an ideal weekend, I would ...

6. If I discovered that my best friend was involved in using drugs, I would ...

7. My greatest reservations about becoming an adult are ...

8. The thing I find most difficult about this class is ...

9. If I knew I had support from others, I would try to ...

10. Something I would really like to accomplish that seems out of the question for me is ...

"LOST ON THE MOON" TEST

Your spaceship has just crash-landed on the moon. You were scheduled to rendezvous with a mother ship 200 miles away on the lighted surface of the moon, but the rough landing has ruined your ship and destroyed all the equipment on board, except for the 15 items listed below.

Your crew's survival depends on reaching the mother ship, so you must choose the most critical items available for the 200-mile trip. Your task is to rank the 15 items in terms of their importance for survival. Place number one by the most important item, number two by the second most important, and so on through number 15, the least important.

____Box of matches
____Food concentrate
____Fifty feet of nylon rope
____Parachute silk
____Solar-powered portable heating unit
____Two .45-caliber pistols
____One case of dehydrated milk
____Two 100-pound tanks of oxygen
____Stellar map (of the moon's constellation)
____Self-inflating life raft
____Magnetic compass
____Five gallons of water
____Signal flares
____First-aid kit containing injection needles
____Solar-powered FM receiver-transmitter

LOST ON THE MOON TEST: THE ANSWERS

Following are the answers to the group problem-solving test, "Lost on the Moon," presented on page 62.

Items	NASA's Reasoning	NASA's Ranks	Your Ranks	Error Points	Group Ranks	Error Points
Box of matches	No oxygen on moon to sustain flame; virtually worthless					
Food concentrate	Efficient means of supplying energy requirements					
Fifty feet of nylon rope	Useful in scaling cliffs, tying injured together					
Parachute silk	Protection from sun's rays					
Solar-powered portable heating unit	Not needed unless on dark side					
Two .45 caliber pistols	Possible means of self-propulsion					
One case of Pet milk	Bulkier duplication of food concentrate					
Two 100-pound tanks of oxygen	Most pressing survival need					
Stellar map (of the moon's constellation)	Primary means of navigation					
Self-inflating life raft	CO² bottle in military raft may be used for propulsion					
Magnetic compass	Magnetic field on moon is not polarized; worthless for navigation					
Five gallons of water	Replacement for tremendous liquid loss on lighted side					
Signal flares	Distress signal when mother ship is sighted					
First-aid kit injection needles	Needles for vitamins, medicines, etc., will fit special aperture in NASA space suits					
Solar-powered FM receiver-transmitter	For communication with mother ship, but FM requires line-of-sight transmission and short ranges					
			Total			

Error points are the absolute difference between your ranks and NASA's (disregard plus or minus signs).

Scoring for individuals:

0-25—excellent	56-70—poor
26-32—good	71-112—very poor, suggests possible faking or use of earth-bound logic.
33-45—average	
46-55—fair	

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D

Name ______________________

Class ________ Date ________ Rating ________

I. Pronunciation *Each of the following words has been divided into syllables. Place the major stress mark (') in front of the syllable that is accented when the word is pronounced.*

EXAMPLE ef face → **ef 'face**

1. di lem ma
3. dead lock
2. cir cum spect
4. re lin quish

II. Part of Speech *In each of the following groups, circle the item that indicates the part of speech of the word given.*

5. efface
a. verb b. noun c. adjective d. adverb

6. spasmodic
a. interjection b. noun c. preposition d. adjective

7. debris
a. adjective b. conjunction c. noun d. verb

III. Spelling *Circle the word that is* **incorrectly** *spelled in each of the following groups. Then supply the* **correct** *spelling in the space given.*

8. opinionated commendeer spurious ____________
9. salvage muddle brigend ____________
10. perenniel cumbersome admonish ____________

IV. Definition *From the list of words given below, choose the item that corresponds to each of the following definitions. Write it in the space given.*

breach **deadlock** **diffuse**
spasmodic **unbridled** **predispose**

11. to spread or scatter freely or widely ____________
12. uncontrolled, lacking in restraint ____________
13. an opening or gap ____________
14. to incline to beforehand ____________

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V. Synonym *In each of the following groups, circle the item that means the* **same as the boldface word** *in the introductory phrase.*

15. a **cumbersome** procedure
a. ingenious b. new c. clumsy d. illegal

16. **circumspect** in their actions
a. generous b. cautious c. foolish d. lethargic

17. **admonish** the crowd
a. scold b. praise c. enlighten d. study

18. an unavoidable **muddle**
a. issue b. subject c. mess d. outcome

VI. Antonym *In each of the following groups, circle the item that means the* **opposite of the boldface word** *in the introductory phrase.*

19. **unbridled** enthusiasm
a. uncontrolled b. unusual c. restrained d. customary

20. **relinquish** one's position
a. surrender b. keep c. verify d. discuss

21. a **spurious** argument
a. valid b. strange c. ingenious d. false

22. **breach** an agreement
a. draft b. study c. break d. honor

VII. Completing the Sentence *From the list of words given below, choose the item that best completes each of the following sentences. Write it in the space given.*

diffuse **dilemma** **debris**
salvage **predispose** **opinionated**

23. Although the fire completely destroyed the structure, we were able to ____________ many of the furnishings.

24. Your inability to decide between the two alternatives leaves me in quite a(n) ____________ .

25. Trying to argue with someone who is that ____________ and hidebound is like trying to nail oatmeal to the wall.

Appendix BB
Guidelines for Portfolio Construction - Grade Twelve

Guidelines for Portfolio Construction:

1. The portfolio will only contain work from English class.
2. The main purpose of the portfolio will be to provide students with a reflective piece that will allow them to look back at their work and see their won growth and development.
3. The portfolio may be seen by parents but will not be taken out of this classroom.
4. Some of the pieces selected in the portfolio will have been graded, others may not have been.

How should the pieces in the portfolio be selected?

1. Only finished products will be contained in the portfolio, no works that are still in progress.
2. The student will select all pieces to be included; the teacher will gladly offer opinions if he is asked.
3. Pieces selected should again follow the theme of demonstrating growth and development.

What specific pieces should be included in the portfolio?

1. Homework
2. Teacher-made quizzes and tests.
3. Peer editing assignments
4. Group work (artifacts or pictures)
5. Reflective journals
6. Written work
7. Rough drafts of written work to show process or progress
8. Graphic organizers
9. Self-assessments
10. Statement of future goals

ASSESSMENT OPTIONS FOR NOVEL STUDY

Appendix CC

Authentic Assessment Project Choices - Grade Twelve

The A to Z Version - Create an alphabet book based upon the novel. Every letter must be represented on a full page. Each letter must be represented by a word, include a visual, and have an explanation on how it pertains to the novel. Make sure to cover the entire novel.

Altering Point of View - Rewrite a chapter from the novel from a different point of view. In your retelling, use vocabulary and thoughts appropriate for a the person telling the story. Make sure to have appropriate reflections about characters and events for that point of view.

Bandstanding - Imagine you are musical director for a film version of the novel. Your task is to select music for ten major episodes of the novel. List the episodes and then make one or two recommendations for music to accompany each episode. Explain why each of your selections fits the mood and outcome of the scene. You may wish to prepare a tape of your music and/or include a voice-over reading of the episodes.

Cecille B. Demovie Producer - You are going to produce this novel as a movie. You must cast the major roles, draw costume designs, visualize setting locations, edit the novel, select appropriate background music and main theme music, identify special effects, write a radio commercial, design a poster, and decide upon the movie rating.

Character CD's - Pretend that one of the characters from the novel has made a CD. You will create the CD jacket. The front cover must contain the title of the CD, the name of the hit single from the CD, and an appropriate drawing pertaining to that character. The front inside will give the lyrics of the hit single. These lyrics are your original creation of a song (poem) that would tell the listener about your character. They may be written for an existing tune or for an original creation. The back inside will contain paragraphs explaining how the songs from the CD reflect that character. The back cover will list ten songs that reflect that character. The ten song titles will be real songs that you feel reflect the character.

Dear Abby - Retell the novel through a series of letters to and responses from an advice columnist. Letters to the advice columnist can be from just one character or different characters. The response from the advice columnist are to be your reactions to the events. Be creative with your advice columnist's name.

I Love a Parade - Create a shoebox parade of floats representing the novel. Besides the actual floats, write a narration that would be read as the parade goes by.

In Memory - Write all of the important pieces for the death of one of the characters. You will write an obituary, a eulogy, and an epitaph.

Making a Storyboard - Pretend that you are the director for a new film version of the novel. Before you begin filming, you must prepare a storyboard of the various scenes of the film. A storyboard is a comic-strip style summary of the action of a particular scene. It indicates camera angles, closeups, etc. Choose two scenes from the novel and prepare storyboards for these scenes.

Mapping the Action - Prepare a map of the places and landmarks mentioned in the novel. Use evidence from the story and your own imagination to situate the items. Then label each location with an event from the story.

Missing Persons Bureau - The main character has turned up missing. Your job will be to develop a missing person's folder for the police department. You will be given special forms and instructions to complete this folder. Different parts include transcripts of interviews with key characters, clues concerning the missing person, and an official police report form.

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The Novel Museum - Design a museum based upon the novel. You will draw up floor plans showing how the museum is designed and where the different exhibits are. You will also write a brochure describing the different exhibits. Include some sketches of what some of the different exhibits might look like.

Poetry Book - Compile a poetry book that includes acrostics, cinquains, diamantes, comparison poems, and bio poems to cover the novel.

Putt, Putt - Develop a nine-hole miniature golf course based upon the novel. Have fun designing the obstacles from the novel into the individual holes.

Reworking the Form - Relate the highlights of the novel in comic book form. Besides using drawings, include significant quotes from the novel. Work objects of symbolic importance into your illustrations. When you are finished, design an appropriate cover for the comic book.

Revealing Relationships - Make charts analyzing important relationships in the book. List what each character in the relationship gains as a result of the relationship and what each loses. You should illustrate your charts with appropriate illustrations and symbols.

Scrapbook Memories - Create a scrapbook for the main character based upon the novel. The scrapbook could contain pictures, mementos, etc. the detail the story. Each item in the scrapbook should have a note saying why it appears in the scrapbook. The scrapbook should be in chronological order.

Scripting Conflicts - Write the script for a "group grievance session" that includes many of the major characters. The purpose of this session should be for the characters to air and possibly resolve their complaints about one another. Topics discussed should include the major events of the novel and the characters feelings about these events. Be sure to stay true to the author's characterizations (from attitude to language) as you write your dialogue.

Shop 'Til You Drop - A new mall is being developed, but this mall is built along a special theme. It will be based on the main character. All the stores in the mall will be connected to the main character in some way. You will design the layout of the mall, write a short brochure describing each business, and develop a flyer for the grand opening sale-- "The Discovery Sale". Your mall should have at least ten different businesses in it.

Time Capsule - You are putting together a time capsule for your novel. What episodes would you want included in a videotape? What are some of the important artifacts that you would want preserved? What letters would the main characters write to include? Where would the time capsule be buried?

The Tribune - Write a series of newspaper stories detailing the major events of the novel. Each newspaper story must include a headline, dateline, byline, and an issue date (this should reflect the passing of time). Remember to write the news stories in inverted pyramid style.

Turning to Technology - Use the knowledge gained from computer class to retell the novel. Develop business cards, emoticons, signatures, slide shows and e-mail. This assessment must be done on a Macintosh computer.

The Video Game - Develop a hint book for a video game based on the events in the novel. The video game will be described by in the hint book by explaining the different levels, hazards, rewards, etc. and it should include illustrations of what different screens in the video game would look like.

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Appendix DD
Authentic Assessment Project Rubric

English 140-141 Project Assessment

1. Creativity	1 3 5 7 9 10	x2 ________
2. Understands topic and project	1 3 5 7 9 10	x2 ________
3. Graphics	1 3 5 7 9 10	x2 ________
4. Presentation	1 3 5 7 9 10	x2 ________
5. Covers Entire Novel	1 3 5 7 9 10	x2 ________

Total ____________

Appendix EE
Student Reflection - Speeches - Grade Twelve

The next thing I'm going to include is my grades for my speeches. This grading sheet shows how well you did in each given area. A few for example are your intro, body, conclusion, poise and eye contact.

The reason I put this in my portfolio is that it shows my improvement by the way I have gotten better in presenting myself. In one of my speeches first speeches I received a C, then after awhile my next speech was a B. This shows my improvement in presenting speeches.

Appendix FF
Student Reflections - Group Bonding Exercise - Grade Twelve

One Assignment that we did, is the learning about my team. When we had to answer questions on a paper about ourselves. The questions had to do with situations in our life that had to deal with our friends. They were personal questions, like times you were embarrassed, and what would your ideal weekend be.

The reason I picked this paper to be in my portfolio, was because it helped me talk more about my feelings, and tell more about my self. I think that I needed work in this area, and putting this in shows my improvement toward working on this problem. Another reason was, it helps me think was would really effect me. What will really embarrassed me, and it helps me think about growing up.

One assignment we did was learning about my team, which we had to answer some questions on a sheet of paper, telling about some situations in your life. Like what we would you do if your best friend was doing drugs. Or what upsets you a great deal. Then, my greatest reservations about becoming a adult are.

The reason why I picked this assignment is because it wasn't any normal assignment. Most assignment are about books you read or pronouns, but this was about your life and it got you to express your feelings on certain topics. And I like doing different things instead of the same old boring work. So I wished we did more of this kind of work

Appendix GG

Student Reflection - "Lost On The Moon Test" - Grade Twelve

For the lost on the moon paper our group had to work together to choose most important items to bring.

For this project we worked together and got the best score in the class.

Appendix HH

Student Reflection - Vocabulary - Grade Twelve

Last year I did not complete more than two or three chapters of vocab and as a result I never did better than 15 on any of my quizzes. This year we did vocab in class so I almost always got good grades on the quizzes.

These three chapter tests show my improvement this year in vocab.

Vocab Tests

This is vocab test chapters 1, 3, 4, 7, 8, 10, 12, 15. I got at least a 23 out of 25 on all of these vocab tests. These scores are all very good.

I chose these because they are all better scores than I have received in the past. I have done very well in vocab this year. I am very proud of myself and have learned many new words that have come into my vocabulary.

These are three of my vocabulary quizzes, chapters 9, 10 and 12. This is an area of major improvement for me. We didn't really do any vocabulary last year, or at least I didn't learn any. So going from a 5 out of 25, to 24 out of 25 is a huge improvement, and I actually remember more of the words now. I think doing a little bit each day helps a lot.

Student Reflection - Portfolio Construction - Grade Twelve

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I do not have enough assignments to complete my portfolio. We were expected to include 15 pieces of our work that showed growth and development. I believe that only 9 of mine actually show any development through the years past. The rest are terrible pieces of work I did not want to even try to make look like improvements. So therefor I only have 9 pieces of my work, instead of the required 15 pieces we were told to include.

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Death of a Salesman Project Assessment

This is the project I did on the book Death of a Salesman. I received a 94 out of 100 on this which is an A. I worked hard on this project. I made a A-Z book of the novel.

I chose this because it is a strong grade and I worked hard on it. I did very well at understanding the topic and covering the entire novel. I am very proud of this project.

The Pearl Project

The first piece I'm putting in my portfolio is the project on The Pearl, by John Steinbeck. What I did is I made a map of what I thought the island that the story took place on would look like. I also labeled landmarks that were important to the plot.

The reason I'm putting this in my folder, is because I did very well on it, and because it's always been hard for me to present things in front of people, and I did a good job on presenting this project.

The next piece is the project for The Pearl and the project I did on Death of a Salesman in which I did very good on The Pearl I got 100/100 and on the Death of A Salesman I got and 86/100. The project consisted of making a golf course that delt with problems relating to the book to each hole of the 9-hole course. The other project consisted of me making newspaper articles on topics relating to the book.

The reason I chose these pieces for my portfolio was because I did a really good job on them and I spent a lot of time working on them.

Appendix KK

Student Reflections - Essay Writing - Grade Twelve

These are three of my papers that I wrote. My Bedroom paper, which is a descriptive paper, my Symbolism in The Pearls paper, and my Narrative paper, Getting Out of Going to Aunt Cathy's. All of these show improvement to me, as I have never gotten very good grades on papers. On all three of these I got A's. I think that shows a lot of improvement.

The Pearl Paper

After we read The Pearl, we had to write about some kind of symbolism that was in the story. I chose to write on how the pearl showed symbolism in many different ways.

In doing this paper, I learned how to pick out an object and show how it symbolizes something. I had never really known how to do that before. Even though I did not get a perfect grade, I still learned how to show symbolism in a story.

The next thing I'm going to put into my portfolio is some papers I wrote. One of them was Death of a Salesman and the other was My Favorite room.

The reason I'm putting this into my portfolio is because I have never been a good writer and I have become a better writer towards the end of the year.